Editorial & Publishing Offices:
MACMILLAN & Co., LTD.
ST. MARTIN'S STREET
LONDON, W.C.2

Telegraphic Address:
PHUSIS, LESQUARE, LONDON

Telephone Number:
WHITEHALL 8831

Vol. 144 SATURDAY, DECEMBER 23, 1939 No. 3660

SOCIAL PROBLEMS OF WAR-TIME EVACUATION

AN admirable review of the problems arising out of the sudden redistribution of population involved in the evacuation of the priority classes at the outbreak of war is given in a broadsheet on the "Home Front" recently issued by Political and Economic Planning (P E P). So far, however, there has been little evidence of any long-term thinking on these problems. Moreover, although a number of individual business firms appear to have acted on Mr. Harold Macmillan's plea for a considered review of the whole policy of evacuation, and returned part at least of their central offices from the country into London or other larger cities, there are no signs that the opportunity of revising and improving evacuation arrangements is being utilized by the Government.

On the contrary, so far from evidence of fundamental thinking about the essential problems, which have such a close bearing on the efficiency of our war effort and morale, everything indicates that evacuation questions are being dealt with as day-to-day exigencies, with little attempt at the long-range thinking which would avoid many of the dilemmas at present involved. Until recently, no serious effort has been made to consider the problems of visitation between parents and children, whether of parents to the evacuation areas or of children to their homes.

The acute problems which evacuation has raised in the sphere of education are indeed realized, and a belated attempt is being made to deal with the difficulties of education of the children remaining in the evacuated areas—difficulties which a firmer and more definite policy at an earlier date might have very considerably reduced. Even in the reception areas, the essential social welfare work has been left to voluntary social service organizations, and local welfare committees, and no organized effort made to meet the needs of the children or adolescents out of school hours, away from home influence and with the long nights of winter already here.

The absence of such national direction and co-ordination not only places heavy burdens on local authorities, but also is apt to engender a feeling of injustice in the reception areas, making for further attrition of the whole evacuation scheme. Its absence leads to grossly unfair burdens falling upon the teachers themselves, who are often bearing much heavier financial charges as a result of the disruption of their home life, apart altogether from the heavier responsibilities and the inroads on their private life. The effect of such factors on the efficiency and morale of the teaching staff is very far from receiving the attention it deserves.

The basis for any long-range policy which is to grapple effectively with the difficulties must be an impartial scientific examination of the facts. It is accordingly encouraging to find that an attempt at a scientific survey of evacuation problems has been made in at least one district. A preliminary report on this investigation, which has been made possible by a grant from the Liverpool Council of Social Service, and carried out by the University of Liverpool Department of Social Science in co-operation with the Liverpool University Settlement under the direction of Dr. Gertrud Wagner, has been published by the University Press of Liverpool.

The report is based on 356 interviews in the neighbourhood of the settlement, and is preliminary to a fuller investigation; but nevertheless it indicates clearly that the difficulties in working the evacuation scheme are due to four sociological and psychological facts. The family—

the basic unit of society—is broken up in the evacuation area or may be gravely disturbed in the reception area, with serious economic and psychological difficulties. For most working-class mothers, the main or even sole purpose in life—bringing up and working for their children—disappears when they are evacuated. Each social group in society has its own standards of living and behaviour, but under the evacuation scheme different groups are forced to live together.

The main difficulties discovered are listed under six heads. There is that of the mother in adapting herself to the new environment, and of the host in accepting the intrusion of someone with a different standard of living. Separation of the parents from the children frequently leads to a serious emotional problem. The provision of additional or better clothing for the children and the cost of fares to visit them present urgent economic problems, while lack of selection in placing the children and sometimes poor organization are a fourth set of difficulties. Removal of children from the reception areas by parents without due consideration or consultation, and the departure of the mother from the home leaving behind members of the family unused to managing on their own, apart from the economic difficulty of keeping two homes going, are further causes of trouble.

These difficulties are not to be dismissed lightly, and the report makes a number of suggestions for meeting them. The appointment of trained social workers in each reception area to visit the homes regularly and give informal advice to the hosts on the care of the children and their education, and to straighten out difficulties the hosts may have had with the children, would solve many problems. Propaganda by wireless talks or in the press advising mothers against visiting their children too soon after their removal from home or against being unduly influenced by letters written in a moment of depression would be of service, while social workers could also assist in diverting heavy demands on the mothers for clothes to organizations dealing with such matters.

Accurate knowledge in advance of the available accommodation in a reception area is essential, and also arrangements for medical examination of evacuees to secure diversion to camps or hostels of those unsuitable for private houses. Requisitioning of empty houses in the reception areas to deal with emergency cases is also recommended, as well as some regulation to prevent the removal by parents of their children without the consent of the appropriate educational authority.

It would be unfair to expect of a preliminary report more than recommendations to mitigate the difficulties, and this investigation, which incidentally, by illustrating the admirable contribution which the universities can make in social research, underlines the recent appeal of the National Union of Students for liberal support by the Government even in war-time, only indicates the wide field open for both private and official investigation if an adequate and resolute policy is to be evolved. Urgent as is the need for such investigations, there are matters in which immediate action is called for. The question of holidays has to be faced boldly and frankly, whether from the point of view of the children, the teachers or the hosts. The construction of school camps needs expediting, and a large expansion of that programme would alleviate many difficulties. The school medical services must be reorganized in time to cope with any of the usual spring epidemics, and strenuous efforts made to safeguard, in reception as well as in evacuation areas, not merely teaching and discipline but also the whole system of milk, medical, nursing and dental services, which largely came to an end when the schools were closed.

One recommendation of the Liverpool report would appear to be fundamental. Unless it is known what numbers of children are to stay in the country, reorganization of education in the reception areas, the opening of temporary schools and hostels, the building of camps, and the release of the local schools from the shift system cannot proceed. Parents should at least be requested by authority to make a definite choice and compelled to abide by it.

Education is, however, only one aspect of civil life which has been disturbed by evacuation, and even here the problems are far from being confined to those of school-children. In technical and university education, problems have been raised which are equally acute even if less in magnitude. Profound disruption has been experienced in professional life, and the recent acceptance by the Ministry of Health of the proposals of the special Advisory Emergency Hospital Medical Service Committee for reorganization of the emergency medical service covering the hospitals, the medical staffing of first-aid posts and the position of specialists, indicates that in one important sphere at least the opportunity of readjustment and reconsideration has been utilized.

Much more, however, might be done to correct defects in our emergency plans, given the willingness of authority to recognize such defects and accept constructive criticism. Measures to facilitate the resumption by adults of family life might well assist in guaranteeing the maintenance of our economic strength and the expansion of industry necessary both for the output of munitions and the buoyancy of the national finances. As Mr. Macmillan suggested, even now large industries and Government departments could consider a return to normal, or at least locate their units in accordance with long-range plans in which all the risks and disturbances are weighed. The surrender by Government departments of schools and hotels so hastily commandeered should not only diminish some of the evacuation difficulties in the educational field but also remove a potent cause of public discontent.

The importance of this factor must not be overlooked. In the absence of any attempt to redress the mistakes made in this matter of commandeering—to repair the disturbance of education and destruction of equipment which occurred although alternative office accommodation was available, or to do justice to those who have suffered from the commandeering of hotels and other buildings—a lack of confidence is engendered alike in the impartiality and the integrity of the central administration. There can be no mistake as to the firm determination of the nation to see war through to victory, or as to the equally firm determination to have the utmost competence in its conduct. Refusal to acknowledge and rectify mistakes, or to accept constructive criticism, only undermines the good will and morale upon which the struggle and, above all, the unprecedented redistribution of population and activity make such tremendous demands.

THE LIFE-WORK OF MY FRIEND F. W. H. MYERS

Human Personality and its Survival after Bodily Death

By Frederic W. H. Myers. Vol. 1. Pp. xlvi + 700. Vol. 2. Pp. xx + 660. (London, New York and Toronto: Longmans, Green and Co., Ltd., 1939.) 36s. net.

FREDERIC W. H. MYERS died in Rome in 1901, just as this century opened; but he left behind him a mass of writing which was afterwards edited and published as two volumes on "Human Personality", reviewed by me in NATURE of June 18, 1903 (**68**, 145). These books represent for all time his real life-work, that for which he was willing to live laborious days; they represent what he genuinely conceived to be a message of moment to humanity; they are his legacy to posterity; and in the light of the facts contained in them he was willing and even eager to die.

Death Myers did not dread. That is true; and his clear and happy faith was the outcome entirely of his scientific researches. The years of struggle and effort and systematic thought had begotten in him a confidence as absolute and supreme as is to be found in the holiest martyr or saint. By this I mean that it was not possible for anyone to have a more absolute and childlike confidence that death was a mere physical event. To him it was an adversity which must happen to the body, but it was not one of those evil things which may assault and hurt the soul.

Myers would have described himself as one who walked by sight and knowledge rather than by faith, and his eager life-long struggle for knowledge was in order that he might by no chance be mistaken. To some, conviction of this kind would be impossible—they are the many who know not what science is; to others, conviction of this kind seems unnecessary—they are the favoured few who feel that they have grasped all needed truth by revelation or by intuition. But by a few here and there, even now, this avenue of knowledge concerning the unseen is felt to be open. Myers believed that hereafter it would become open to all.

The doctrine which Myers arrived at after years of study is that each individual as we perceive him is but a small fraction of a larger whole, is as it were the foliage of a tree which has its main trunk in another order of existence. The metaphor constantly breaks down, as all metaphors must sooner or later; for some purposes it would seem better that the tree should be inverted; and the adjective "subliminal" contains no reference to what is beneath, except in the sense of foundation and support; in every other aspect the subliminal is probably the more real and more noble, more comprehensive, more intelligent self, of which the supraliminal development is but a natural and healthy and partial manifestation.

The products of the subliminal are to be regarded as "higher" in a definite sense than those of the supraliminal. The supraliminal is that which is the outcome of terrestrial evolution, and so is able

to manifest itself in a planetary manner; the subliminal has a cosmic existence, which may play a part in terrestrial evolution hereafter, but at present only shows signs of doing so, as, for example, in the supernormal uprushes which are known as the inspirations of genius; signs which may be taken as anticipatory of the course of evolution in the future.

In this way sleep, death, genius, insanity, hysteria, hypnotism, automatism, clairvoyance, and all other disintegrations, abnormalities, and supernormalities of personality, fall into a consistent comprehensive scheme; and it is the object of the work to elaborate this hypothesis and to unify all these strange features of human personality, features which have so long afforded an exercise alternately to resolute credulity and to blatant scepticism, and have so perennially perplexed mankind.

The central feature of the book is the "Scheme of Vital Faculty", an elaborate and comprehensive scheme, which will be found in the second volume between pages 505 and 555, a scheme on which Myers bestowed a great deal of thought and which I saw emerging from his pen at the time he was writing it. It constitutes a synthesis or conspectus of the whole, wherein each vital faculty is displayed under the aspect appropriate to the three heads, somatic, psychic, and pneumatic; or, as he styled them, supraliminal, subliminal, and spiritual.

How far such a scheme as this soars above the range of the orthodox science of to-day is apparent from the fact that few of the faculties catalogued and classified in it, beyond those in the first category, are as yet generally recognized as existing at all. A few from the second or middle category are coming into recognition—such as suggestion, hyperæsthesia, psycho-therapeutics, and telepathy—but the greater part even of this second list is still only on the outskirts of recognized knowledge; while in Myers's view it is the third and at present wholly ultra-scientific category which lies in the path of future knowledge and development, and constitutes the most pregnant portion of his message to mankind.

It is not to be claimed that these volumes will convince a reader of the survival of personality beyond bodily death if he was previously hostile to or otherwise fortified against such an idea. Perhaps they will convince nobody. The main object of the work is not edification and finality, but stimulation to inquiry; and convictions of any value are seldom attained by mere reading: they can only be formed by soaking one's mind in a subject for years, by "continually thinking unto it", as Newton said. As the outcome of such a process, it became Myers's undoubted belief that intelligence and human personality persist beyond bodily death; and that, between the two states or conditions of being, intercommunication though difficult was not altogether impossible. But this conclusion of his has been popularly seized and over-emphasized until to many of his contemporaries it seemed that an easy credulity on this point was his characteristic attitude. Nothing could be further from the truth. Easy credulity does not lead to a life-long labour and evolution of a comprehensive scheme such as this.

It would have been an appalling blunder to have allowed such a book as this to fade out of remembrance and become impossible of attainment by the younger generation, especially at a time like the present.

OLIVER J. LODGE.

OLD AND NEW ASTRONOMY

One Day Telleth Another

By Stephen A. Ionides and Margaret L. Ionides. Pp. xii+324+31 plates. (London: Edward Arnold and Co., 1939.) 10*s*. 6*d*. net.

MANY books have been published on descriptive astronomy for general readers, ranging from simple stories intended to interest children in the starry heavens to surveys of celestial fact and theory requiring the intelligent attention of mature minds to comprehend them. All such works tend to remove the heavens farther and farther from the earth, though to early peoples these were complementary parts of a living universe. The quaint figures which, in ancient times, marked the positions and forms of the zodiacal and other constellations have disappeared from celestial globes and maps, and the goddess Urania has lost her place among the other muses.

Mr. Ionides and his daughter have revived the human spirit in ancient astronomy and have thus given new life to its presiding genius. In some aspects, their book is reminiscent of "Astronomical Myths", by J. F. Blake, which was based upon Camille Flammarion's "History of the Heavens", and describes early observations and conceptions relating to the earth and the universe associated with the affairs of life and with religion. That

work, and R. A. Procter's "Myths and Marvels of Astronomy", were published more than sixty years ago, and are unknown to most of the present generation of observers and readers of astronomy. The volume before us, written in the light of additional archæological knowledge and astronomical discovery, should appeal to a wide circle of readers more interested in humanistic aspects of science than in simplified accounts of new scientific knowledge—factual or speculative.

The subjects of the chapters are time, days, seasons, the sun, the moon, eclipses, planets, comets, calendar, precession, constellations, navigation, geography, astrology, and cosmology; and in each of them old and new ideas are lucidly combined and interpreted. The field of inquiry and thought is vastly more extensive now than in the times of the astronomers of Babylonia, Egypt and Greece, but the intelligence of man has not undergone similar expansion; and if philosophers of those ancient days could be reincarnated now, they would see clearly, in Mr. and Miss Ionides' book, how present knowledge has developed out of their own contributions in a natural sequence.

What would be strange to such philosophers is the great extension of the field of observation rendered possible by the use of optical and other scientific instruments. But though we now measure time and angle in seconds, the division of the zodiac into twelve signs of 30° each was the origin of the division of the circumference of a circle into 360°. As to the use of the number twelve, the late Dr. J. K. Fotheringham, the great authority on ancient astronomy and chronology, showed that it was used by the Sumerians to divide the day, and that the Babylonians afterwards divided day and night each into twelve hours. It was natural for the Chaldeans, with whom sixty was an important number in their system of numeration, to use it in subdividing the hour into sixty minutes, and, later, into sixty seconds. The construction of accurate instruments to measure seconds of time and angle came long after these units had their origin.

It is of interest to trace in a single chapter of this volume how the old and new astronomy are combined; and that on the sun may be appropriately used as an example. The sun as the source and benefactor of all life on the earth was the essential idea of the religions of many ancient peoples, and its worship was particularly dominant in Egypt. The first truly monotheistic religion was that founded by Ikhnaton, whose followers worshipped the sun as a symbol of the one and only God—"Thou disc of the sun, Thou living God: there is none other beside Thee". In his "Moses and Monotheism", Freud, shortly before his death, traced the transition of Ikhnaton's teaching from Egypt into Palestine with the Exodus of the Hebrews. Long afterwards, Ezekiel was lamenting that the women of Israel were weeping for the departure of Tammuz—the sun-god of the Sumerians, Babylonians and Assyrians. Out of these ideas came the Greek gods of the sun—Phœbus and others—but these deities then became objects of inquiry, and Aristarchus used geometry to estimate the distance of the sun from the earth. About 1000 B.C., Zoroaster identified the "God of Light" with goodness, and evil with darkness, and called his god Mazda, the name given to-day to a well-known type of electric lamp. Because the study of light belonged to theology, it was encouraged when other branches of physical science were snares of the devil. So we are led up to modern times, with the discovery of helium in the sun by Sir Norman Lockyer (whose name, however, is not mentioned), and its isolation twenty-six (not twenty as stated) years later by Sir William Ramsay from the mineral cleveite.

Continuing their romantic story, the authors proceed to some modern aspects of solar physics. Referring to terrestrial influences of sunspot activity, they state that wet and dry seasons are associated with the sunspot cycle, but this simple relationship has never been established. Prof. A. E. Douglass's studies of the rings in sections of tree-trunks, though of scientific importance, cannot in any way be accepted as proof of such a connexion; while the statement that there were no spots on the sun during the seventy years from 1645 to 1715 requires more confirmation than that given in "a letter from a London astronomer". From sun-spots the authors pass to the chromosphere, prominences and the corona, and they point out that the form of the corona at minimum epochs of solar activity is roughly represented in the "ring with wings" found throughout Babylonia, Assyria and Egypt. Many motor-cars to-day carry upon their bonnets a form of the Egyptian ring with wings. The chapter ends with a reference to Dr. B. Lyot's photographs of the solar corona and prominences without an eclipse and to the construction and use of Hale's spectroheliograph.

The other fourteen chapters of the book similarly combine the archæology of astronomy with modern knowledge of the heavens. The pattern presented to the human mind to-day is made up of the warp and woof of time and thought from many stages of civilization; and, though the ultimate design be still unknown, the loom will continue to weave the threads of knowledge into a fabric which worthily represents man's endeavours to understand Nature and his place in it.

R. A. GREGORY.

STRATIGRAPHICAL STUDIES OF CALIFORNIA

Miocene Stratigraphy of California

By Robert M. Kleinpell. Pp. ix+450+22 plates. (Tulsa, Okla.: American Association of Petroleum Technologists; London: Thomas Murby and Co., 1938). 22*s.* 6*d.*

THE geological pioneer in any newly explored area distinguishes certain broad stratigraphical units, based primarily on lithic characters, and secondarily on the contained fossils. He correlates these units roughly with those on the familiar time-scale. As subsequent research, in the course of years, is extended in area and intensified in each locality, palæontological evidence becomes increasingly important, and problems of interpretation and correlation arise. Does a well-marked lithic change, say, from shale to sandstone or limestone, correspond to a definite moment of time, or did it take place earlier here than there? What faunal aggregates may be trusted as exact age-indexes (zone-fossils), and which give ecological evidence (facies-fossils)? How can time-divisions based on Foraminifera be correlated with those based on Mollusca, echinoids or vertebrates? All these problems are faced by Mr. Kleinpell in his revision of the Miocene of California.

The Neogene of California is disposed in tectonic basins, about a dozen in number, from Humboldt in the north to Los Angeles in the south. About half-way along is the Paso Robles basin, and in this lies the Reliz Canyon, which provides the author with his type section. The aerial photograph serving as frontispiece shows the area to be sufficiently arid to give a practically continuous exposure; but one must admire the painstaking determination with which so many successive associations of Foraminifera were collected, identified and tabulated. Such labour would scarcely have been thought of without the stimulus which the search for oil has given to the detailed study of Foraminifera.

The first half of the text consists of discussions on matters of correlation, which are not only of great importance to all who are concerned with the Tertiary geology of the Pacific slope of North America, but also to all geologists interested in the problems outlined in the first paragraph of this notice. The author introduces a new series of divisions (with new names) which he believes to have a precise age-value, replacing such well-known terms as Monterey Shale, which will always keep their broad stratigraphical and physiographical usefulness, but are misleading when taken as corresponding to the same duration of time wherever they occur. This first part is illustrated by maps, sections and tables, the largest of which occupy a pocket in the cover. Bibliographical references are very full. The second half is a systematic catalogue of Foraminifera, illustrated by twenty-two plates. There do not appear to be any new species.

This should be the standard work on the Miocene of California for years to come. A. M. D.

IN PRINCIPIO ERAT VERBUM

An Ecological Glossary

Compiled by J. Richard Carpenter. Pp. ix+318. (London: Kegan Paul and Co., Ltd., 1938.) 15*s.* net.

THERE are two ways of compiling a glossary: the critical and exclusive, and the complete and impartial. Dr. Carpenter adopts the second method. Its advantage is that it brings all the varying terms and expressions together and reveals in a striking way the inconsistencies and unresolved conflicts found in a comparatively new science such as ecology. Its disadvantage is that it conceals the dead words and meanings among the living. A compromise, relegating obsolete words and meanings to smaller print or brackets seems desirable and might be suggested for future editions.

Ecology, like genetics and other recent disciplines in biology, applies to both plants and animals. It is interesting to examine its terminology from this point of view. Evidently botany was the predominant partner at the time the special terminology was in process of formation, as all the basic terms for associations appear to rest on plant criteria. Only in such ancillary matters as bird-watching do we find an infiltration of terms based on zoology. This may, of course, be due in part to the fact that the plant constituents of a society are more fixed than the animal ones and less liable to wander out of the picture; but it seems probable that zoological terms will bulk more largely in future editions. The glossary shows certain inconsistencies in terms which ecology shares with genetics, for example, 'variation'; and Dzierzon's 'theory' or 'concept' is just a fact.

The sight of more than three thousand technical

expressions brought together moves one to reflect on their quality as language. The great majority of ecological terms are from the Græco-Roman, to which biology seems undivorceably if unhappily wedded. They vary in sound from the not unpleasing 'kalloplankton' and 'quaquaversal' to the repellent 'autephaptomenon' and 'necrocoleopterophilous'. It is at times a shock to meet a native word, like 'plot', which appears sandwiched between 'ploadostadion' and 'plotophytes'. Prof. Clements, the noblest Græco-Roman of them all, is credited with more than four hundred terms. The non-classical words are broadly international; most abundant are German (translated), Spanish and Portuguese; but French, Italian, Danish, Norwegian, Afrikaans, Serbian, Russian, Magyar, Arabic and Swahili words occur, together with some unidentified by the reviewer. One wonders if it is wholly wise to use outlandish languages; though they sound as a rule better than the Greek examples, they are difficult to check and thus lead to confusion; witness the entries under 'igapu', 'ygapo' (not cross-referenced), 'igaqu' (p. 228) and 'caagapu', all apparently equivalent to the 'rebalsa', or in plain English, flood-forest, of the Amazon.

The book, though not free from misprints, is well produced. In addition to 287 pages of glossary there are a useful introduction and a bibliography, while appendixes give tabular comparisons of the plant-sociological terms of opposing schools, and reprint important plant and animal regional maps. Dr. Carpenter cites, wherever possible, the author from whom he takes his definition, with the date—a practice to be commended to all compilers of scientific glossaries. He has carried out his task in a painstaking and exhaustive way, going so far as to define 'foreshore', 'reprint' and 'peck-order'. The book will be popular in university departments and will prove a valuable basis for any later critical survey of ecological terms. B. S.

THE WORLD AFFAIRS SERIES

Oxford Pamphlets on World Affairs

No. 1: The Prospects of Civilization. By Sir Alfred Zimmern. Pp. 32. No. 2: The British Empire. By H. V. Hodson. Pp. 32. No. 3: Herr Hitler's Self-Disclosure in "Mein Kampf". By R. C. K. Ensor. Pp. 29. No. 4: Economic Self-Sufficiency. By Prof. A. G. B. Fisher. Pp. 32. No. 5: "Race" in Europe. By Prof. Julian Huxley. Pp. 32. No. 6: The Fourteen Points and the Treaty of Versailles. By G. M. Gathorne-Hardy. Pp. 40. No. 7: Colonies and Raw Materials. By H. D. Henderson. Pp. 32. No. 8: "Living-Space" and Population Problems. By R. R. Kuczynski. Pp. 32. No. 9: Turkey, Greece and the Eastern Mediterranean. By G. F. Hudson. Pp. 32. No. 10: The Danubian Basin. By C. A. Macartney. Pp. 32. No. 11: The Dual Policy. By Sir Arthur Salter. Pp. 32. No. 12: Encirclement. By J. L. Brierly. Pp. 32. No. 13: The Refugee Question. By Sir John Hope Simpson. Pp. 32. (Oxford: Clarendon Press; London: Oxford University Press, 1939.) 3*d*. net each.

THE admirable series of Oxford Pamphlets on World Affairs, of which the first thirteen titles given above were published before the outbreak of war, have lost nothing of their value on that score. The brief accounts they give of current international topics will serve to assist in the clear understanding of the events which forced Great Britain into war, and to strengthen the determination to bend all our efforts to success.

In the first pamphlet of the series, Sir Alfred Zimmern discusses the factors which have destroyed internationalism in the modern period, the necessity for applying moral standards to political relations, and the problem of adjusting the social and political habits and traditions of mankind to the conditions of the modern world. The optimism of 1919 failed to recognize the dimensions of the problem that lay before the civilized world. Sir Alfred insists that the problem which baffles and discourages us in 1939 has political, economic and moral elements. The last he considers is the most important; for, if least urgent, it is a permanent problem in all political life. The difficulties which have always attended this problem, for example, from the fact that politics is concerned with power, have been intensified by the enlargement of the rule of political life through the multiplication of international contacts, and also through the weakening of moral standards. While Sir Alfred does not believe it is possible to eliminate the tension between moral ideals and political realities, it is quite possible to lay down general principles of political conduct which afford sure guidance in particular circumstances as they arise.

In regard to the economic element, which is a long-distance problem of adjusting the social and political habits and traditions of mankind to the conditions brought about by the Industrial Revolution, Sir Alfred suggests that we should begin by finding the smallest change in our established social and political habits and arrangements which will enable mankind to reap the benefits of the

age of power, abundance and interdependence. Determination of the least possible change, not the greatest possible change, would, by easing the strain on the ordinary citizen, make it possible to reap the benefits which science has placed within our power. In regard to formation of a new habit of mind to meet the requirements of our problems, it is sufficient that most of the citizens of the responsibly governed countries should be world-minded.

On the political side, Sir Alfred considers the political problem of Europe to-day is that of the political immaturity of the German people. Until that chronic condition has yielded to treatment, Europe will remain a politically backward continent, and the statesmanship of the democracies, which otherwise might be fully employed in breaking down prejudices surviving from outworn conditions and leading the European peoples into the larger world opened out to them by science, must be expended in counteracting or overthrowing a senseless militarism.

This pamphlet is followed by one on the British Empire by H. V. Hodson, in which the status of the different members of the British Commonwealth of Nations, the position of the Crown in Imperial relations, the question of Dominion neutrality in time of war, the co-ordination of defence, trade relations within and without the British Commonwealth, problems of migration and race are concisely and lucidly explained and discussed. This is followed by Mr. R. C. K. Ensor's account of Herr Hitler's disclosures of policy in "Mein Kampf" and of the extent to which this policy has so far been carried out. In addition to assessing future possibilities, Mr. Ensor briefly describes Hitler's theory of 'race', the doctrine of *Lebensraum* or 'habitat', and the scale of annexation prescribed for Greater Germany. In the fourth pamphlet, "Economic Self-Sufficiency", Prof. A. G. B. Fisher discusses the fallacies which underlie the policies of 'autarky' or economic self-sufficiency, the pursuit of which in certain countries has aggravated the economic problems of the world in recent years. In the fifth pamphlet, based on sections of the book "We Europeans", under the title "'Race' in Europe", Prof. Julian Huxley demolishes the myth of racialism and shows that the theory of an 'Aryan race' is a myth. The violent racialism in Europe to-day is a sympton of Europe's exaggerated nationalism; it is an attempt to justify nationalism on a non-nationalist basis, and to find a basis in science for ideas and policies which are generated internally by a particular economic and political system, are relevant only to that system, and have nothing to do with science. The cure for the racial mythology with its accompanying self-exaltation and persecution, is a re-orientation of the nationalist ideal and an abandonment of claims by the nations to absolute sovereign rights. Science is bound to point out the biological realities of the ethnic situation and to refuse to lend sanction to the racial absurdities and the racial horrors perpetrated in the name of science. Prof. Huxley states that all the facts are against the existence in modern Europe of anything in the nature of separate human races. He also deals with national types, the Jewish question and the advantages of race mixture.

A seventh pamphlet, "Colonies and Raw Materials", by H. D. Henderson, discusses the value of colonial possessions to a metropolitan country, especially as sources of 'raw materials'. Mr. Henderson concludes that the industrial peoples of Europe, whether they possess colonies or not, have no reason to apprehend any difficulty in obtaining tropical raw materials, or raw materials of any kind, in a peaceful world. One of the problems of world-economics to-day is the excess of supply of primary products over demand. While the supply of raw materials of most types is tending to increase more rapidly than before, the populations of the industrial countries are increasing more slowly and will soon probably decrease.

The next pamphlet in the series (No. 8), by R. R. Kuczynski, examines in detail the so-called problem of *Lebensraum* or living space. Dr. Kuczynski's survey of this problem of population leads to the conclusion that from an economic point of view Germany's living-space is more valuable now without colonies than it was before the War of 1914–18 with colonies. She does not require colonies to relieve population pressure in the mother-country. Her former colonies would not be in a position to provide her with foodstuffs; they could only supply her with a negligible fraction of her requirements of raw materials, unless forced labour were introduced on a gigantic scale. The return of her former protectorates overseas is demanded for military reasons and to exploit them at the cost of the 'natives'.

Other aspects of this question are discussed by Prof. J. L. Brierly in Pamphlet No. 12 ("Encirclement"), in which the political significance of the problem of *Lebensraum* is indicated. Prof. Brierly, pointing out the reality of encirclement, shows how nearly all European countries are in fact encircled, but the encirclement of which Germany complains is a defensive measure provoked by Germany's own aggressive measures and broken faith. A pamphlet by Sir Arthur Salter (No. 11: "The Dual Policy") largely summarizing his book "Security: Can We Retrieve It?", outlines the policy pursued by the British Government since March 15, 1939, resting on the twin foundations, resistance to force, and the constructive work of building peace.

MAGIC IN MEXICO

IT has been remarked by more than one observer of the population of Mexico that whether account be taken only of the indigenous inhabitants of purely Indian descent, who subscribe to the observances of the Catholic Church, or those of mixed blood be brought into the picture, it includes a large number who habitually, and as a matter of course, take part in ceremonies and rites which are either completely pagan or have been adopted into the local ecclesiastical calendar with no more than a veneer of Christianity, which barely covers and does not disguise their true character. In remarking on such observances, no reference is intended to the beliefs and customs of those Indian peoples of Mexico who are as yet but little affected by European civilization, and of whom there is still a considerable number.

A record of some remarkable ceremonies of a magico-religious nature has been made recently by Dr. Robert Gessain in the course of an expedition to the Hidalgo State or Province of Mexico, on behalf of the École française de Mexico, to which reference is made in another column of this issue (see p. 1039). Although compelled by ill-health to return to Europe before his work was completed, Dr. Gessain was able so far to win the confidence of a suspicious people as to be allowed to witness the performance of a number of these ceremonies, and also to secure descriptive accounts of others which had not been performed for very many years. The observances, it is believed, or known in certain instances, have a wide currency, with local variation, among neighbouring Indians belonging to groups other than that with which he was concerned; but it was impossible, owing to the circumstance mentioned, for him to enter upon the comparative study, which is obviously an essential for fuller understanding.

The Indians among whom Dr. Gessain's researches were carried on are the Tepehua, a group numbering approximately six thousand, who live in the village of Huehuetla of approximately a thousand inhabitants, and the surrounding district, which falls within the respective borders of three States, or provinces, Puebla, Hidalgo, and Veracruz, and lies on the Atlantic slope of the high central plateau. The Tepehua are surrounded by villages of Otomi and Totonac; and although on lingustic grounds they have been assigned to the Totonac group, it is permissible to doubt whether their affinities with their neighbours have been defined with complete certainty. They have been visited by European observers on two previous occasions only—Frederick Starr in 1900, and Helga Larsen in 1934.

While participation in similar ceremonies, or rather their local variants, appears to be virtually universal among the Otomi, the number of Tepehua who take part regularly is about two thirds of the total, the strict Roman Catholics standing aloof. There is, however, a considerable marginal body which is prepared to take part in pagan ceremonial or Christian ritual indifferently. The mixed breeds, numbering about a hundred, being resident with a view to commercial interests only, take no part.

Owing to a variety of influences, the cult has tended to become something in the nature of a survival within the last twenty or thirty years. The sorceror-priests (*brujos*) are less numerous, and the performance of the ceremonies is now of a less extended character. Nevertheless, the cult is still full of vitality, as is shown by the amounts the votaries are prepared to pay the *brujos* for the performance of a ceremony, such as that of the opening of a new house, or in connexion with the birth of a child. The cult is said to flourish with most vigour in San Francisco (Veracruz), where Tepehua emigrants are numerous.

The ritual ceremonies are many in number. Of these, some, connected with the routine of cultivation, or the climatic cycle, are periodic; others are occasional and indeed, it was stated, had not been performed for twenty-five or thirty years. Again, the ceremonies may either be associated with an individual misfortune, such as an illness, or a collective disaster, such as a river-flood.

Dr. Gessain describes in detail a number of ceremonies, or magical practices, in which the services of the *brujos* are sought: the opening of a new house or sugar cane mill; the ceremony of the maize harvest or general harvest festival, in which the whole community takes part, and at which all *brujos* are present, but receive no fee; a ceremony in the dry season for the protection of the maize and the other crops from both drought and the depredations of birds and vermin; for the bees, this a fertility ceremony when an insufficiency of wax is being produced, wax being of more importance than the honey on account of its use for ritual purposes; the installation of a sorceror-priest; when the river floods, again a ceremony at which several *brujos* are present, and most or all the members of the community; for curing disease and ill-health; against epidemics; for curing sterility in women; at and after child-birth; to secure the fertility of young girls; for the dead and

after death; and numerous enchantments to procure or retain love; to ensure fidelity in the married; to avert jealousy, and the like.

Without entering into an analysis of the details of the ceremonies, which Dr. Gessain describes, attention may be directed to certain characteristics which afford a general idea of the nature of the ceremonies. They usually include offerings and a sacrifice, normally a fowl or a turkey, which is decapitated by the *brujo*, either with his *machete*, or with his hands. Sometimes, especially when the ceremony is intended to secure a personal benefit, such as the cure of sterility in a woman, or at the installation of a *brujo*, the blood of the victim is drained into a vessel, and used to make the mark of the cross on certain parts of the body of the individual in question. The head of the victim, sometimes also the dismembered body, may be buried, but more often among the Tepehua, the victim is cooked for the sacrificial feast; or with the other offerings it may be thrown away in the river or buried. Among the Otami, of the village of San Gregorio, the offerings of food placed on the altar raised to the dead are thrown away at a customary place at the end of the village, instead of being eaten as among the Tepehua. It is essential that the meat for the sacrificial meal should be cooked and served by women who are not members of the household in which the ceremonies are being held, and this rule applies also to the women who perform the office of laying out the dead. The ceremonies are led by the *brujo*, or sorceror-priest, who performs the sacrifice, supervises the laying out of the feast, censing the food and table with copal, and leads the dances and chants which make up the greater part of each ceremony, apart from the offerings, the sacrifice, and the sacrificial meal. Should a procession form part of the ceremony, as in that for rain, it is headed by the *brujo*.

The ceremonies take place at night, often lasting the whole night through. They usually take place in the house of the individual concerned, for example, when an illness is being treated, or in the death ceremonial; but ceremonies in which the whole community takes a part may take place in the house of one of the *brujos*, as, for example, happens at the celebration of the harvest festival. This is interpreted by Dr. Gessain as evidence for the survival of a hierarchy among the priests. Among the Tepehua of San Pedro a special house is set aside for the celebration of ceremonies in which the whole community is interested or concerned.

A fee is paid to the *brujo* for the performance of all ceremonies, except the communal harvest feast. The installation of a sorceror-priest costs the candidate a fee of several hundred pesos, which is paid to his sponsor, under whose instruction he has been for the preceding twelve months. He also provides his sponsor's clothes, which includes two scarves which have been woven by the women, strangers to the household, who are responsible for the preparation and serving of the sacrificial meat. These scarves must be woven and completely finished in the two days before the ceremony takes place.

It is interesting to note the relation of these ceremonies to Christian ritual and concepts. The harvest festival, for example, is held on September 16, which is the feast day of St. Michael, as well as the national day of Mexico; and the ceremony for the protection of vegetation in the dry season takes place on Palm Sunday. Among the Otomi of San Gregorio, at the time of the sowing of the seed, *munecos* (paper figures) are cut out in different colours according to the nature of the crops. These with sacred flowers, a species of Dianthus which plays a prominent part in all ritual performances, are placed in the church. There is no Catholic priest here.

It is perhaps worth noting, though Dr. Gessain offers no comment, that at the sacrificial meal at the installation of a *brujo* thirteen places are laid on the table, of which the thirteenth place is smaller than the rest, and receives a half-portion at each service, of which there are four. After each service, the meat is taken from the plates and placed in two *ollas* or jars standing ready for the purpose, prior to its consumption by the company.

Enough has already been said to indicate the function of the *brujo* or sorceror-priest. It is a remunerative office. Should such a ceremony as, for example, the opening of a new house not be performed, any serious illness of an inmate which may follow, or any misfortune, will be attributed to that fact. Such stress, indeed, is laid upon it, that a *brujo* will often exhort the owner to borrow the money (six pesos) rather than omit it.

The *brujos* of Huehuetla are five in number. The initiate whose installation is described was a man of about fifty years of age. In the ceremony three altars were erected in the house of the initiate, in which the ceremony took place. The altars differ in size, and the largest is left standing after the ceremony to be the *brujo's* special altar for the remainder of his life. The head of the turkey which was offered at the ceremony, and with the blood of which he was marked with the cross, was buried in this altar. The altar is destroyed at a ceremony fifteen days after the *brujo's* death. During his lifetime it is always adorned with sacred flowers, paper figures and clay saucers. Burning tapers appear on the altar only while a ceremony is taking place. The crystal which he

uses for magical and divinatory purposes rests on it in a clay saucer. This crystal occupied the smallest of the altars at his initiation. Another property of the *brujo* is his *idolo*. This is an antique statuette or figurine, which has been dug up by the *brujo*, often at a great distance away. Frequently it may consist of no more than a head, in which event it is completed in wood and is dressed either as man or woman. This also rests on the *brujo's* altar and is the object of a cult. Some *brujos* may have several of these.

The *brujo* enters into relation with the spirit world on several occasions and by various methods. In the fertility ceremony of the bees he addresses "the advocate of the bees", and at the very close of the harvest festival on September 16 he sets up his *idolo* and addresses a chant of invocation to it. In the rain ceremony a procession is made to a certain marsh and the *brujo* addresses to the goddess of the marsh (*sirena della laguna*) a list of the offerings which are to be thrown into the water; and she is implored to appeal to "the Lord of the Sea" should she not control water enough in the marsh to cause sufficient rain to fall. Among the *munecos*, which are thrown with other offerings into the lake, is one in two colours in the form of a young boy which is said to symbolize the *brujo* himself. One of the most interesting examples of the relation of the *brujo* to the spirit world is seen in the opening of the ceremony for the harvest, when the sorceror-priest retires under the table, which is draped with a fibre mat, thus forming a species of lodge. A cup of chocolate and a cake are handed to him, and here he remains in communion with the spirits for the space of one hour. At the ceremony of the installation of a *brujo*, when offerings of food are being served, twelve times he fills a vessel with cane spirit, and tenders it in the gesture of offering, first above, then below, the table before pouring it away into a bottle. When anyone who is seriously ill has been cured by the ministrations of the *brujo*, he offers apologies to the dead of the family.

The star cult, which is a prominent feature of Otomi belief, has also influenced the religious ideas of the Tepehua, while the cult of the moon appears in the ceremony for curing sterility in women. This ceremony is addressed to the moon, as it is believed that sterility is caused by the moon's anger.

The remarkable element in all these ceremonies, however, is the liberal use of paper 'figurines', the *munecos*, either decorative patterns cut in rectangular sheets of coloured paper, or in silhouette, the latter being most frequently employed for the human form. The decorative forms are conventionalized, as is the human form; but usually it is possible to recognize what it is intended to represent, especially in the flower and corn forms, while the symbol for agricultural operations is readily to be identified, when it is realized that it represents the furrow made by the plough. The representation of the stars is more formal, but starlight in the sky is clearly intended. The human form, both male and female, though conventional in attitude and characteristics, which conform to certain standardized patterns, is otherwise sufficiently realistic. Many of the more decorative *munecos*, especially those in which crops and flowers are represented, recall the European cut-paper ornaments of the Victorian age, which perhaps may have influenced their development. European influence, even in the representation of the human form, seems to be clearly indicated. This, however, is not a question which has been discussed by Dr. Gessain.

Starr records the use of bark paper, but this apparently is now used only by the Otomi. The Tepehua always use paper which they purchase from the half-breed traders, and use for no other purpose. The *munecos* are not used singly. Not only are several different patterns used in each ceremony, each with its special function, but also a large number of each are cut out and used in various ways.

The magical function of the *muneco* is varied. In certain instances it is little more than an amulet with apotropaic power, as for example, when it hangs across a road to bar the approach of an epidemic to a village. The idea that the *muneco* may act as a detergent agent seems to be present in the ceremony of healing the sick, when *munecos*, sacred flowers and a live fowl are rubbed over the body of the patient. When the fowl has been killed, it is wrapped in the *muneco* and the whole, including the flowers, is thrown in the river. That they may symbolize a spirit, human or other, is indicated by the *muneco* used in the ceremony for the dead, which takes place on the bank of the river a week after death. It represents the *brujo* trampling on the corpse to prevent the spirit of the dead man from returning, while in another, used in the ceremony to ward off epidemics, the *brujo* is represented dancing on a devil, presumably the spirit of the disease. In its magical use the employment of a representation of the human form recalls the power given the European witch and others by the use of a waxen image. When a woman seeks the help of the sorceror-priest to gain influence over her husband, or to prevent him beating her, in the former instance *munecos* are given her to place secretly in his pillow. These represent him at her feet, or in prefiguration beneath her feet; and the images are sometimes duplicated to enhance the influence she will have over him.

Further, spirits which are not human may be conceived as actually embodied in the *muneco*. When in the ceremony for rain the participants return from invoking the Sirena, two *munecos*, one male and one female, accompany the procession and are carried as standards. Before they start, water is dipped from the marsh and scattered over and around them, and this is kept up at intervals as long as is possible along the road. They are the helpers, or ministers, of the Sirena, who have been charged to carry water for the fields, which will fall as rain. They are left hanging over the road at the entrance to the village, while others have been left along the road.

Comparative study of this body of ceremonial, which Dr. Gessain was unable to undertake, but it is to be hoped is only postponed for a future occasion, would be of the greatest interest. The magical use of the human figures recalls, for example, the appliqué needlework, showing European influence, of San Blas (Panama).

RECENT WORK ON EXPERIMENTAL PARTHENOGENESIS*

BY PROF. A. D. PEACOCK,
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IT is proposed here to outline some recent biological and cytological studies in experimental parthenogenesis. The rearing of reproductive parthenogones and parthenogenetic strains after experimental treatment has been achieved only once. The Russian worker, Astaurov[1], after subjecting unfertilized ovarian or newly laid eggs of the silk-moth, *Bombyx mori*, to increased temperature, obtained adults from which descended three successive parthenogonic generations. Out of 25,770 caterpillars only 11 were males. His work developed from Sato's[2] in Japan, adults of both sexes, males predominating, being obtained after the use of hydrochloric acid or other chemicals. As the female in Lepidoptera is the sex-determining sex, these different results are possibly due to the different agents affecting differently the sex-determining mechanism in the eggs, or to physiological conditions, for example, degree of maturity, in the different eggs.

The next most successful results are limited to frog parthenogones advanced enough to be sexed, only two cases being known. Twenty years ago Jacques Loeb, after needle-pricking of eggs, reared certain specimens which Parmenter[3] later sexed: 21 metamorphosed tadpoles—18 male and 3 female; 34 tadpoles—12 male (one metamorphosed), 2 apparently changing into males, 18 female and 2 of doubtful sex.

Cases of adult, or of metamorphosed, but unsexed parthenogones are also few. So early as 1907 Delage[4] reared metamorphosed sea-urchins and starfish, while, recently, Parmenter[5] obtained five metamorphosed tadpoles after needle-pricking, and Kasansky[6] reports his curious experiment by which healthy adult carp were reared from eggs stirred in male human saliva.

Artificial parthenogones of worms Mollusca, echinoderms and amphibians attaining stages as advanced as the larval are more numerous but still comparatively few (Delage[4]). Recent additions comprise the echiurids *Urechis caupo*, activated with dilute sea-water by Tyler[7], and *U. unicinctus*, for which Hiraiwa and Kawamura[8] used ammoniacal sea-water (which gave the best results), shaking, or warm, hyper- or hypotonic sea-water, or sea-water containing potassium cyanide. The eggs of freshwater fishes are promising material, for those of pope, perch, roach, bream and pike developed when Trifonova[9] used water at 28°–30° C., or distilled, while early embryos of pike developed after Kasansky's[9,10] use of diphtheritic serum, sugar, salt, warm water, onion juice and mustard, etc.

Recent mammalian work presents remarkable features. In 1927 Champy (see Pincus[11]) discovered an 8-celled stage in a virgin rabbit's ovary cultured in rabbit plasma plus fowl embryonic extract. In 1930 Pincus achieved astonishing success by taking unfertilized rabbit eggs from the Fallopian tube and culturing them *in vitro* in plasma clot, or in serum, plus embryonic extracts; of 213 eggs 63·8 per cent developed, ranging from the 4- to the 40-celled stage and even to the morula, the stages to all appearance resembling *in vivo* specimens. Results approaching these appeared also in Garufi and Oliva's cultures[12] of rabbit eggs from ovarian follicles. Further, Pincus[11] even obtained blastulæ by transplanting into the Fallopian tubes of pseudo-pregnant rabbits eggs artificially activated by agents commonly used for invertebrate eggs—hypertonic solutions, heat and

* From a paper read before Section D (Zoology) of the British Association at Dundee on August 31.

weak acids. Previously, by such agents, Pincus and Enzmann had induced second polar body formation and also that of two polar bodies (Pincus[11]).

Also of remarkable interest is Harvey's[13] success in parthenogenetic merogony. Centrifuged sea-urchin eggs (*Arbacia punctulata*) divided into spherical halves and quarters, and those without nuclei, activated with hypertonic sea-water, developed into blastulæ (one with 500 cells), one embryo without gut, anus or skeleton actually being obtained. Later successes relate to other sea-urchin species and to activation by monochromatic ultra-violet radiation.

Traumatic parthenogenesis has been further exploited by Kling[14], who has made steel needles with points as fine as 1 μ, the diameter of a sperm head, and much finer than those hitherto used. With these and less fine needles he has activated frog eggs. But he has also induced activation solely by applying pressure with a blunt instrument, without membrane rupture. The activatory function of the sperm he regards as chemical, a purely mechanical function being excluded because a much weaker developmental effect is produced by a needle point of the same diameter as a sperm's despite the needle wound being of greater size. Further, pressure alone sufficing for activation, he attributes the initiation of activation to processes set in action by traumatization of the egg cortex, membrane rupture being unnecessary.

Regarding the chromosome constitution of experimental parthenogones, Parmenter[5] has discovered an interesting range of conditions in 26 frog tadpoles; haploids numbered 10; diploids 9 (5 metamorphosed); haploid-diploid forms 4; diploid-triploid forms 1; diploid-triploid-tetraploid forms 1; and triploids 1.

Maturation and autoregulation show a diversity of conditions. No autoregulation can have occurred in Parmenter's haploid tadpoles and normal reduction must have occurred; there is cytological evidence for this in the lamprey's egg (Montalenti[15]) and in certain eggs of the echiurid *Urechis unicinctus* (Hiraiwa and Kawamura[8]). These new cases can, therefore, be grouped with the few others known in echinoderms and molluscs, and are comparable to those few cases in Nature exemplifying 'rudimentary parthenogenesis'. The viability, partial at least, of haploid animals is also illustrated by Parmenter's haploid tadpoles and by other previously known parthenogonic larvæ.

Autoregulation in natural parthenogenesis may be designated "post-maturational", in which diploidy is *regained* during ontogeny, and "maturational", in which diploidy is *retained* consequent upon chromosome behaviour that prevents the egg from becoming haploid. Now in the great majority of cases of natural obligatory parthenogenesis, diploidy is retained because the reduction division is suppressed, the single division occurring being equational, and it is a curious fact that, as yet, no like case is known in experimental parthenogenesis. On the other hand, Parmenter's[7] experimental haploid-diploid tadpoles provide the unique example of autoregulation being delayed until the larval stage. All the other methods of natural autoregulation now find their parallel in the cases of experimental parthenogenesis, thanks in part to recent research. For example, the silk-moth egg in Russia provides the sole case in experimental parthenogenesis in which autoregulation occurs late in segmentation—in the blastoderm (Frolowa[16]); the silk-moth egg in Japan (Sato[2]), as well as a minority of Russian eggs (Frolowa[16]) and some of Parmenter's frog eggs, provide new cases of autoregulation occurring at about the time of the first segmentation division; others of Parmenter's frog eggs probably add another case illustrating autoregulation due to fusion of polar body and egg pronucleus; some eggs of *Urechis unicinctus* probably illustrate autoregulation by non-release of the haploid set of chromosomes normally extruded in the second polar body (Hiraiwa and Kawamura[8]); in *U. caupo* certain eggs possibly omit both maturation divisions (Tyler[7]), lending supporting evidence to Doncaster's[17] old interpretation regarding parthenogenetic gall-fly eggs. Some of these cases also illustrate the polymorphism of autoregulation in one and the same species even when the same experimental procedure is seemingly followed, for example, the eggs of frog, silk-moth and *Urechis unicinctus*, the last example manifesting types of autoregulatory behaviour additional to those cited above. Such polymorphism, however, may be due to undetected differences in the eggs. Of autoregulation in rabbit eggs cultured *in vitro* little is known, though Pincus[11] has observed fusion nuclei and indications that diploid cleavage nuclei occur.

The problems of segmentation and cell division receive fresh light from Harvey's parthenogenetic merogones of sea-urchin eggs. These develop asters and divide in a fairly orderly manner, and division is independent of such cell inclusions as yolk pigment and mitochondria and also of the presence of the nucleus—though not necessarily of nuclear secretions. Again, cleavage is independent of spindle and asters but dependent on the physical and chemical state of the protoplasm and its surface layer. Nor is the orderly succession of cleavage essential, for the cytoplasm may break up irregularly but still give a blastula. Cleavage, budding and fragmentation are therefore different expressions of the state of the cytoplasm or of

the cell surface or of both. The maternal cytoplasm seemingly has potentialities for determining at least the early stages of development, a matter that lies at the root of the problem of genetical inheritance, for it raises questions regarding the functions and relations of cytoplasm and nucleus. To what may these potentialities be traced? Normally the cytoplasm receives nuclear material when the germinal vesicle breaks down, but the role of such material in maturation and segmentation is not known; nor is there certainty that the cytoplasm receives secretions from the intact germinal vesicle. Nevertheless it would be unwise to exclude the latter possibility occurring prior to the experimental removal of the vesicle from the egg fractions. Another possibility is that the chromatin of the previous generation influences the maternal cytoplasm. Of these matters Harvey is well aware.

Regarding experimental activation, the work of R. S. Lillie, Just, Runnström[18] and others with sea-urchin eggs indicates that its initiation is due to the release and interaction of substances originally separated in the egg cortex, with the consequent formation of an acid which may be a fundamental activator.

The physiological bases of experimental parthenogenesis have been discussed in masterly fashion by Dalcq[19] and he cites the serious limitations in our knowledge. The types studied have been mostly aquatic and the facts gleaned from them are of limited application to the majority of parthenogenetic animals, which are terrestrial. Cytological knowledge is really patchy and incomplete. No common activating principle has been found in the many agents used, nor has the nature of experimental activation been elucidated. How far the mechanisms of experimental and of natural parthenogenesis and of fertilization are identical is unknown, while as for the origin(s) of natural parthenogenesis, experimental methods have not as yet revealed them.

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OBITUARIES

Mr. C. J. Bond, C.M.G.

BY the death of Mr. C. J. Bond, Leicester has lost one of her most distinguished and also most beloved citizens. Few lives can have been more completely devoted to the service of mankind. He was a 'philanthropist' in the literal sense of the word.

Bond's skill as an operating surgeon, combined with his kindly and considerate manner towards his patients, had brought him one of the largest surgical practices in the Midlands, but he retired from private practice at a comparatively early age (in 1912) in order to have more time for purely scientific and social work. He was specially interested in biology and genetics, and he carried out numerous interesting experiments, extending over many years, in the breeding of poultry and pigeons. Another special interest was eugenics, and he delivered the Galton Memorial Lecture, under the auspices of the Eugenics Society, in 1928.

When the War broke out in 1914, Bond offered his services to the War Office and became consulting surgeon to the Northern Command with the rank of Hon. Colonel, A.M.S. As the representative of the Medical Research Council, of which body he was an active member for many years, he served on the Inter-Allied Commission on the Treatment of War Wounds, held in Paris during 1916–18. He was twice mentioned in dispatches and was awarded the C.M.G. in 1917.

Possessed of exceptional ability and a seemingly tireless capacity for work, C. J. Bond readily gave his support to causes and movements which he believed would benefit his fellow-men. In this brief notice it is quite impossible to enumerate all his many activities and interests, though reference should be made to his work for the Leicester Royal Infirmary, of which he was consulting surgeon, member of the Board of Governors and vice-president; also to his work for University College, Leicester, which he helped to start and of which he was a member of the Board of Governors; and for the Leicester Literary and Philosophical Society, of which he was twice president. Nationally, he served on the Departmental Commission on the Cause and Prevention of Blindness; on the Industrial Fatigue Research Board (of which he was deputy chairman); Lord Trevethin's Committee on the Prevention of Venereal Disease; the Advisory Council of the National Health Insurance Committee, etc. He was a life member of the British Association.

Bond was a strong advocate of total abstinence and an active and generous supporter of the temperance movement, both locally and nationally.

He was the author of several books, for example, "The Leucocyte in Health and Disease", which embodies the results of much painstaking original research work; "Essays and Addresses of a Surgeon", and Chapter v in "Health and Healing in the Great State", edited by H. G. Wells. He also made numerous contributions to current medical and scientific literature.

During the later years of his life, one of Bond's chief interests was the movement for voluntary euthanasia. He helped to found the Voluntary Euthanasia Legalisation Society, and he was chairman of the executive committee for the five years since the Society was started. Undoubtedly, the great prestige attaching to his name has greatly helped the movement, and he had the satisfaction before he died of seeing it steadily growing and apparently firmly established.

To those who knew C. J. Bond intimately—as it was my privilege to do for more than thirty years—he will be chiefly remembered, not so much on account of all the good work he accomplished during his long and active life, as on account of what he was. He was a man of absolute integrity, scrupulously conscientious in everything he did or said, and modest of character, almost to a fault. It is impossible to think of him as ever being guilty of an unkind, selfish or unworthy action.

He leaves a widow, a son who is in the medical profession, and a married daughter.

C. KILLICK MILLARD.

Prof. C. G. Santesson

PROF. CARL GUSTAF SANTESSON, the eminent Swedish pharmacologist who died on July 26, was born in Stockholm on July 5, 1862, the son of the professor of surgery at the Karolinska Institutet. He received his medical education at Uppsala, Stockholm, and Lund, and qualified at Stockholm in 1890. During the next two years he studied pharmacology under Schmiedeberg at Strassburg and Boehm at Leipzig. On his return to Sweden he became lecturer in pharmacology at Uppsala, and in 1895 was appointed extraordinary professor in this subject at the Karolinska Institutet at Stockholm, becoming full professor in 1908. He retired in 1927.

In addition to numerous contributions to periodical literature on pharmacology and toxicology, Santesson was the author of a work on general pharmacology (1919). From 1901 until 1916 he was editor of the *Nordisk Medicinskt Arkiv* and from 1924 until his death of the *Skandinavisches Archiv für Physiologie*. The high reputation which he enjoyed at home and abroad is shown by his being a member of the Academies of Sciences of Uppsala, Stockholm, and Halle, the Finnish Medical Society and the German Pharmacological Society. An address on his life and work was delivered at a meeting of the Swedish Medical Society by Prof. G. Liljenstrand, his successor in the chair of pharmacology, and published with his portrait in the *Nordisk Medicin* of October 14, and the issue of *Acta Medica Scandinavica* of October 17 contained the address delivered by Santesson two months before his death on the occasion of the publication of the hundredth volume of the journal.

J. D. ROLLESTON.

NEWS AND VIEWS

Anthropological Investigation in Mexico

ON p. 1033 of this issue extracts are given from an account of some remarkable magico-religious observances recorded by Dr. Robert Gessain in the district surrounding Huehuetla, a village in the State of Hidalgo, Mexico, in which in certain respects the use of paper figurines, or *munecos*, recalls practices of Old World witches and the employment of waxen images against their victims. The expedition, of which Dr. and Mme. Gessain were the personnel, was the fifth of a series sent out by an organization for which Dr. P. Rivet of Paris is mainly responsible. This organization, known as the "École française de Mexico", sends out each year a research worker to carry on investigations in that country. In view of Dr. Gessain's qualifications as medical man and anthropologist, in which capacity he had already worked in Greenland, the objective of the expedition was mainly to record observations in physical anthropology, including racial pathology, combined with linguistic and ethnographic inquiry as a subsidiary aid in gaining the confidence of the people. Equipment for testing blood groups and making psycho-physiological observations was also carried. Unfortunately much delay in reaching the base of operations was caused by difficulties in getting the scientific equipment into the country; and after a few weeks work only, both members of the expedition were taken seriously ill and had eventually to return to France. This happened at a peculiarly inopportune moment, as they had just made a beginning in breaking down the hostility and suspicion with which their early inquiries had been received. Notwithstanding this unfavourable attitude of the inhabitants, a number of interesting anthropographic and demographic observations have been made—the congenital or 'Mongolian' patch was found on all infants—and, in addition to the cultural evidence noted above, songs, technological films and a large number of anthropological and ethnographical photographs have been secured.

Oil and its Uses

THE Petroleum Films Bureau (15, Hay Hill, Berkeley Street, London, W.1) now has a library of fifteen films about oil which may be borrowed free

of charge by schools, technical colleges, scientific societies and other educational organizations. Both 35 mm. and 16 mm. sound and silent films are available. Synopses of these films giving an indication of the main themes dealt with are to be found in a catalogue recently issued by the Bureau. The films fall into three main sections, dealing with the varied aspects of oil production and drilling, some of the uses to which oil is put, and its particular adaptation to the requirements of the modern petrol engine, respectively. In the production and drilling section, there is one more or less general film giving an indication of how oilfields are discovered and wells drilled, which countries produce oil and how it is transported in tankers across the seas. This is followed by others having a more local bias. The work of James Young on the production of oil from shale and the subsequent establishment of the Scottish shale industry is only one of several themes which lend themselves admirably to pictorial development. Illustrations of the uses of oil are as diversified as they are manifold. They embrace fishing for swordfish, re-fuelling an Imperial Airways liner at Kisumu and spraying trees to destroy insects, to cite only a few examples. The films depicting first principles of internal combustion and compression ignition engines and the theory and practice of their lubrication are of necessity less spectacular in their conception. Nevertheless the diagrams and models will prove of great assistance to those seeking lucid explanations of technical details.

Antiquity

IN the December issue of *Antiquity*, the editor discusses in the frankest terms the future and the policy of that publication in relation to present conditions in international relations and world affairs. After the most careful survey of all possibilities and probabilities, it has been decided "to take courage, and at any rate plan for the year 1940". In arriving at this decision notwithstanding the difficulties which arise both from the almost complete cessation of all archæological activities on the outbreak of war, and from the absence on active service of many of its contributors and subscribers, the editor's decision has been determined largely by the view that the periodical for which he has been responsible both in and since its inception represents an essential contribution to learning and progress to which, so far as is humanly possible, there should be no interruption. In this opinion he is fortified by expressions of opinion from his supporters, of whom one writes that it is "of paramount importance that all *foci* of Culture and Learning should be kept alive" during the present troubles. While endorsing in the strongest terms this formula of one, at least, of the functions of publications of the class to which *Antiquity* belongs, we would also second the more readily the editor's appeal for continuance of that support from the public which has helped him to win for this publication the position which it holds in cultural studies to-day.

An Early Gas Mask

ATTENTION is directed in the *Journal of the Royal Society of Arts* (Nov. 3, p. 1239) to a description of a mask which appeared in vol. 43 of the Society's *Transactions* (1825). It was designed by John Roberts, of St. Helens, Lancashire, "to enable persons to breathe in thick smoke or in air loaded with suffocating vapours", and was effective against smoke and also against a gas such as sulphurous acid. It consisted of a leather hood with two apertures filled with glass or mica to see through. The hood descended to the bottom of the neck, was well wadded at the bottom, so as to be rendered airtight, or nearly so, when secured by the straps attached. From the nose a flexible leather pipe is attached, terminating at the bottom in a trumpet-shaped piece of japanned tinplate, the open end of which is plugged with a moist sponge kept in place by a piece of coarse cloth. Breathing is carried on through the tube, and any particles in the air or vapours or gases in any considerable degree absorbable by water are removed by the cloth filter and the moist sponge. An illustration shows a very workman-like piece of apparatus. Details are given of various tests that were made with it.

Alcoholism and Suicide

DR. MERRILL MOORE (*New England J. Med.*, 221, 691; 1939) discusses the relation between alcohol and suicide in a paper based on the study of 143 alcoholic patients, admitted to the Boston City Hospital during the period 1915–38, who had attempted suicide, out of a total of 1,195 admitted during the same period after attempting suicide; 98 were men and 45 women. The great majority were between the ages of thirty and forty. Conditions of occupational, marital or economic maladjustment were present in all. By far the greatest number were unemployed or of unknown employment, and few skilled workers were included. As regards motivation the reasons offered for the attempted suicide were occupational maladjustment, domestic friction, depression and anxiety. Poison by mouth, especially iodine, the ineffectiveness of which was probably not realized, was the most popular method of suicidal attempt. Inhalation of illuminating gas came next, while less frequent methods were slashing, jumping from high places, hanging, immersion and firearms. 136 (95 per cent) were unsuccessful in their attempt and only 7 (5 per cent) died after admission to hospital, as compared with 11 per cent of the total number of suicidal patients admitted. Dr. Moore attributes the large number of failures in suicidal attempts among the alcoholic patients partly to the ingestion of non-poisonous substances or sub-lethal doses, and partly to the tendency of the alcohol to render the method of suicidal attempt less efficient.

Social and Technical Aspects of Housing

THE methods employed in Belgium, the United Kingdom, Denmark, Finland, France, the Netherlands, Norway and Sweden for improving urban and

rural housing conditions, and in the United States of America and Canada for urban housing, are reviewed in a study entitled "Urban and Rural Housing" conducted by M. B. Helger, of the Swedish Social Board, which has been published by the Economic Intelligence Service of the League of Nations (Geneva: League of Nations. London: George Allen and Unwin, Ltd. 3*s*. 6*d*.). The study has special reference to the cost involved and the results obtained, mainly in the housing problems raised after the War of 1914–18, and the attempts at solving those problems up to the outbreak of hostilities in 1939. Separate chapters are devoted to each country, and figures are given showing the need for additional accommodation, the lack of modern conveniences in existing dwellings, and the number of existing dwellings which should be repaired, or demolished as unfit for further use. General aspects of the housing problem are discussed in an introductory chapter in which the two aspects—social and technical—of the problem are distinguished.

In regard to the social aspects, the causes of fluctuation in building activity and their bearing on the periodic shortage of houses are examined. The technical aspects are concerned with the quality of housing and are better treated separately because the ideas of public authorities as to minimum standards appear to make it impossible to solve the housing problem merely by the operation of supply and demand. This is partly because the income of many families is inadequate to enable them to obtain housing with the minimum conditions of health and comfort, and partly because many families fail to appreciate the importance of these conditions and make no effort to obtain suitable housing even when they can afford to pay the rent for it.

Economizing on House Fuel

According to *Science Abstracts* of November 4, E. S. Draper, director of the regional planning studies, reported at a meeting of the Committee on the Hygiene of Housing of the American Public Health Association, that by using adequate insulation against heat loss when building a small house, the cost of the fuel required can be reduced by nearly one half. A simple heater suitable for the central heating of small houses was developed after tests at the Gilbertsville Dam construction community and is now being placed in the open market. The insulation studies were carried out in two identical four-roomed houses in the Niwassee Dam construction community. The installation of electrical heaters made it possible to record with great accuracy the heat loss in the two houses. One of them was insulated throughout by wool bats in the walls and over the ceiling and an insulation board under the floor joists. Both houses had both doors weather-stripped. Both families obeyed the same schedule of window-opening in bedrooms at night, windows closed by day, and the heaters were turned on and off at the same times. The reduction in the total heat loss in the insulated house was 44·75 per cent. The cost of the insulation, including labour and materials, was about £40. The simple heater described by Mr. Draper was designed to effect a reduction in the capital cost of central warm air heating over that of installing the warm air furnaces available in the market. The object was to have a primary heat source (without provision for air filtering or humidification) placed in an exceptionally small first floor heating chamber centrally located, so that it might give service to all rooms of a small house without the usual extensive system and basement.

Accessibility of University Theses

"The Accessibility of British University Thesis Literature", a pamphlet prepared for the Nottingham meeting of librarians last September by Colonel Luxmoore Newcombe, principal executive officer of the National Central Library, is a full and careful survey. A thesis usually contains original matter which may be important for the advancement of the subject, and the range of special studies has been enlarged of late. It should be easily consulted, if only that the work may not be duplicated by some other specialist. This accessibility, the writer shows, is far from being satisfactorily arranged at present. He gives a list of all the theses for degrees at British universities, and the conditions under which they can be consulted. He includes also the collections of foreign theses available. Oxford received between 1885 and 1938 about 263,000 of these. Great Britain has no great guides to her published and unpublished theses such as exist in Germany, France and the United States.

The French issue annually a volume containing on an average 2,150 entries, well indexed. The American catalogue of "Doctoral Dissertations" during 1937–38 includes 2,768 items, but here the degree sought is so common among teachers that good subjects are getting rare, and descriptive rather than original stuff finds a place. The library of the University of Aberdeen has no printed list after 1937. Edinburgh has published an annual list since 1931, but it cannot be purchased. In London an annual list of titles is published and a cumulative catalogue is to be made out of it every five years. Medieval studies and history are fortunate in special catalogues. Only six universities have both an author and a subject index. A national guide to all British theses should be made, and its natural place would be the Central Library. It should be possible for friends of research such as the Carnegie Corporation to back the scheme with adequate funds. Colonel Newcombe also suggests that the Library might have a copy of every foreign thesis on loan. The photostat seems a suitable means of increasing the supply of duplicates at the various universities.

Astronomy in Ancient Egypt

The traditional view that the knowledge of astronomy of the Greece of classical times had been derived from Egypt, a view to which the writings of the Greeks themselves lent support, has lost favour with increased acquaintance with the achievement

of the peoples of Mesopotamia in this branch of science, and of the indebtedness of Greek thought to Babylonian and Assyrian conceptions of the nature and movements of the heavenly bodies. At the same time, research on the astronomical knowledge of the ancient Egyptians has shown that its basis of exact and scientific observation has, if anything, been overrated. At the recent autumn meeting of the National Academy of Sciences, held at Brown University, Providence, R.I., on October 23–25, Dr. O. Neugebauer, in a communication on "The Egyptian Picture of the Sky" (*Science*, **90**, 410; Nov. 3, 1939), pointed out that while Egyptian and Babylonian astronomy are usually quoted as equivalent foundations of Greek, and, therefore, medieval and modern astronomy, really very little is known about Egyptian astronomy. Investigation of Demotic texts, however, has now shown that Egyptian methods of treating the movements of the moon and planets were only very approximate, and without any consideration of details. This picture, Dr. Neugebauer stated, has now been completed by a Demotic text recently purchased by the Egyptological Institute in Copenhagen, which shows how the aspect of the sky and the setting and rising of the stars was connected with the religious myths. The close connexion of religion, especially so far as the underworld is concerned, with the changing aspect of the sky during the year indicates that the main interest of Egyptian astronomy was not a mathematically detailed description of very complex effects, but merely a rough scheme, just good enough to reflect the main traces of the observed facts.

Submarine Valleys

DURING the last nine years, the United States Coast and Geodetic Survey has made an intensive acoustic survey of the Atlantic continental shelf and slope of the United States. The surveys are now so far advanced that the surface topography can be studied in detail. Charts of most of the slope have been published by the Geological Society of America (Special Paper No. 7; 1939). The *Geographical Review* of October 1939 publishes "Atlantic Submarine Valleys" by Mr. R. A. Smith, with a chart on a scale of 1 : 1,000,000 of the shelf and slope, and adjacent land, between New England and Albemarle Sound. Even on this reduced scale many striking features are shown. The flatness of the shelf is so remarkable that only by the use of a five-fathom contour interval can any noticeable relief be shown. The slope, on the other hand, shows a topography so irregular and broken that a 100-fathom contour interval has to be employed for the sake of lucidity. While the shelf, for a distance of 60–125 miles seaward, shows beach forms, the outcome of marine erosion, or modified river forms, the continental slope is deeply dissected and shows forms characteristic of subaerial erosion. In many places the complexity of relief is much greater than that found in the Appalachian Mountains and is more comparable, according to Mr. Smith, with that of the western mountains of North America.

Lancashire and Cheshire Fauna

THE twenty-fifth annual report of the Lancashire and Cheshire Fauna Committee adds a large number of insects to the dual county lists and also to the British area and some species new to science. Among Coleoptera, *Philonthus jurgans* Tott. was discovered new to science from a specimen obtained at Ashton-under-Lyme in 1935, since when it has been found widespread throughout the British Isles, also occurring in Cheshire at Tarporley and Arden. *Aphis davidsoniella* Theob., a species that has been separated from *A. rumicis* L., has been obtained on dock at Preston and Stalybridge. The fly *Bairamlia nidicola* Ferriere is described as new from material obtained from flies breeding in birds' nests at Mobberley, Cheshire. Six new moths are added to the dual counties' lists and one new to Lancashire. The bird, mammal and Lepidoptera notes are largely of local interest, but some of the more general items include the breeding of the death's head moth from larvæ at Raby, Cheshire, a 1927 specimen of the rare migrant Camberwell Beauty at Alderley Edge, Cheshire, numerous foreign insects collected from imported fruit and other goods, the beetle *Cryptophagus acutangulus* Gyll feeding abundantly on the mould on damp plaster in almost all the new houses in the district, increasing numbers of red squirrels in the Ribble valley and in west Cheshire, detailed reports of the surveys on reed-warblers, tufted duck and turtle-dove surveyed for the British Trust for Ornithology, Lapland bunting at Ainsdale, where the little tern is nesting again, the spotted crake nesting in Cheshire, the bittern at Rostherne, the quail near Nantwich and increasing numbers of reports about many wading birds and duck formerly considered rare in the districts but which are obviously much more frequently seen now. The committee, of which Prof. J. H. Orton is chairman, has a membership of 280 and commences the year with a surplus of £146.

Merseyside Naturalists' President

THE annual meeting of the Merseyside Naturalists' Association (the Merseyside Branch of the British Empire Naturalists' Association), held at Liverpool Museum on December 3, elected Mr. R. K. Perry, keeper of vertebrates at the Museum, president for 1940, Dr. J. C. P. Miller, lecturer in applied mathematics in the University of Liverpool, as chairman, and Mr. Eric Hardy as honorary secretary. Formed last winter, the Society faces the War with a surplus in its ordinary and its sanctuary accounts, and will shortly issue a portfolio of its faunal and floral work during the past year.

Horticulture of the Lily

THE eighth number of the Royal Horticultural Society's Lily Year-book (from the Society's Office, Vincent Square, Westminster, S.W.1, 5*s*. paper, 6*s*. cloth), makes a very effective attempt to keep pace with the multitudinous variations of these plants. Mr. A. Simmonds lists the names and origins of 114 hybrid lilies, and there are papers which

clarify the taxonomic positions of *Lilium bulbiferum* and its varieties, by Dr. Fred Stoker, *L. myriophyllum*, by Mr. A. D. Cotton, and *L. pardalinum* and its allies, by Dr. Vollmer. A happy personal note is struck by Mr. A. D. Cotton, in a biography of the late Dr. E. H. Wilson, a vigorous botanical explorer who contributed greatly to liliaceous garden beauty. Capt. F. Kingdon Ward describes a new lily which he discovered in the Assam Himalayas, and Mr. M. Ogilvie-Grant has collected several new fritillaries in Greece. Other papers deal with the cultivation and horticultural grouping of the lilies which are now well-tried favourites of our gardens. Scientific work upon lily matters does not appear to have been great in amount. Dr. M. A. H. Tincker describes the rates of growth of roots in several species, and there is an account of a discussion on propagation. The net result, however, is to show the need for more accurate scientific knowledge of all phases of lily horticulture—the relation of lilies to soil conditions, to nutrition in general, to pests and diseases. There are, indeed, sufficient unanswered questions in the book to employ a lily research station for a considerable period.

Plant Growth-Substances

A RECENT report in the *Kew Bulletin* describes experiments conducted in co-operation with the garden staff but designed by Dr. C. R. Metcalfe and Dr. W. G. Templeman to test the influence of synthetic growth-substances upon the rooting of cuttings of many plants ("Experiments with Plant Growth-Substances for the Rooting of Cuttings". By C. R. Metcalfe and W. G. Templeman. *Bull. Misc. Information*, No. 8; 1939). Their results show that some 45 per cent of the species they selected have responded favourably to one or other of the treatments, which included the use of solutions of indolylacetic acid, indolylbutyric acid, and α-naphthylacetic acid, at different concentrations. The list of plants is a thoroughly representative one including many well known to practical propagators to be exceedingly difficult to root from cuttings. Their successes include some seventeen plants already listed by the Plant Hormone Committee as difficult to propagate in this way, but their results also show that other difficult plants have failed to respond to the treatments. The tabular presentation of the data affords ready reference, and many nurserymen and gardeners generally will consult their list, which, however, contains records of failures with a few species which have been successfully propagated elsewhere at perhaps other seasons of the year. It is hoped that this work will be extended to include tests of these substances applied in powder form.

Plant Disease Nomenclature

THE "List of Common Names of British Plant Diseases" compiled by a sub-committee of the British Mycological Society's plant pathology committee has been accepted by the principal societies and institutes in Great Britain which need to use such names. A certain number of emendations to the second edition are published in the Society's *Transactions* (**23**, Pt. 3; October 1939). No major correction appears to be necessary; the changes are such as give increased exactitude about the authorities for the names adopted, or which remove doubts previously felt about the nature of some diseases. Reasons and references are given for the more significant changes, and any mycologist interested further in this standard nomenclature may obtain additional information from Dr. G. C. Ainsworth, secretary of the Plant Pathology Committee, Imperial Mycological Institute, Kew, Surrey.

Demography of Dublin

IN the recently published report on the State of Public Health of Dublin for the year 1938 the Medical Officer of Health, Dr. Matthew Russell, states that the estimated population of the city was 477,000, the density of the population being 25·4 per acre, compared with 40·4 in 1929. The birth-rate, which was 24·4 per 1000 of the population, has shown a continuous decline since the beginning of the century, when the rate was 33 per 1000. The death-rate has shown a continuous but greater decline. In 1900 it was 30·5, whereas in 1938 it was 13·31, a drop of approximately 57 per cent. The infant mortality, while showing a considerable decline from that in the previous two years, was 98 per 1000 births, as compared with 106 in 1937 and 115 in 1936, is higher than the average—97—for the previous ten years. In 1934 the figure was as low as 74. The maternal mortality in childbirth showed a rate of 2·5 per 1000 births; the average rate for the previous ten years had been 3·07.

Earthquakes Registered at Kew

DURING November 1939 eleven earthquakes were registered on the seismograms at Kew Observatory, this number being probably fewer than the average. Nine of these are reported to have been small or confused by microseisms, and the other two both occurred on November 21. The first was received at 8h. 55m. 8s. G.M.T. with the *P* and *S* waves of small amplitude followed by large amplitude surface waves, and is stated to have been destructive in north-east Anatolia. The second was registered at 11h. 10m. 30s. G.M.T. and has been estimated to have occurred about 85 degrees distant in a direction north-east of Kew, with a deep focus, approximately 175–200 km. below the earth's surface.

Earthquake in New England

ON November 15 at about 3h. G.M.T. an earthquake was registered on the seismograms at the observatories of Weston, Georgetown, Ottawa, Pittsburgh, Fordham, Williamstown and Philadelphia. The United States Coast and Geodetic Survey, in co-operation with Science Service and the Jesuit Seismological Association, has determined the probable epicentre of this shock to have been near latitude 39° 45′ N., longitude 75° 18′ W., and that it had an origin time 2h. 53m. 48s. G.M.T. with a depth of focus near 25 km. below the earth's surface. Large earthquakes are very rare in these regions,

though small shocks and tremors have occurred very occasionally in the past. That the present shock released only a very small amount of energy, thus being no exception, is shown by the facts that no damage has been reported in this well-populated region, and that the earthquake was not registered on the seismograms obtained at Kew.

American Association: Columbus Meeting

THE one hundred and fifth meeting of the American Association for the Advancement of Science is being held during December 27–January 2 at Columbus, Ohio. General sessions will be held on December 27, when Dr. Wesley C. Mitchell, of Columbia University, will deliver an address as retiring president of the Association on "The Public Relations of Science"; on December 28, when Dr. Kirtley F. Mather, of Harvard University, will deliver the annual address arranged jointly by the Association and the Society of Sigma Xi, taking as his subject "The Future of Man as an Inhabitant of the Earth"; on December 29, when Dr. Julian S. Huxley will deliver the first address in the United States under the arrangement between the American and British Associations to provide lecturers in alternate years, speaking on "Science, War and Reconstruction"; and on December 29, when Dean Marjorie Nicolson of Smith College, will deliver the annual address under the auspices of the United Chapters of Phi Beta Kappa, and will speak on "Science and Literature". Symposia have been arranged on "Isotopes", "Photosynthesis", "Speciation", "The Relation of Ecology to Human Welfare", "Defence Mechanisms in Plants and Animals", "The Internal Environment and Behaviour", "Effects of Science upon Human Beings" and "Blood, Heart and Circulation", among other topics.

Awards of the Geological Society

THE following awards of the Geological Society of London have recently been announced: the Wollaston Medal to Mr. Henry Woods, formerly University lecturer in palæontology in the University of Cambridge, in recognition of the value of his researches into the mineral structure of the earth, especially his studies of fossil Mollusca and Crustacea from the Cretaceous formations of Great Britain, Africa and New Zealand; the Murchison Medal to Prof. Arthur Holmes, professor of geology in the University of Durham, in recognition of the value of his petrological researches and of his stimulating studies concerning the composition and physical state of the earth's interior; the Lyell Medal to Prof. H. L. Hawkins, professor of geology in the University of Reading, for his eminence in palæontology, particularly in his studies of the Echinoidea, and for his researches in Eocene stratigraphy; the Wollaston Fund to Miss Dorothea M. A. Bate for her investigations of Pleistocene mammalian faunas in Palestine and the Mediterranean; the Murchison Fund to Archibald Gordon Macgregor, for his petrological researches into Scottish rocks and his work on the geology of Monserrat; a moiety of the Lyell Fund to Miss Dorothy Hill, for her researches on Palæozoic corals; another moiety of the Lyell Fund to Mr. L. H. Tonks, for his work on the Carboniferous rocks of Lancashire and Northumberland.

Announcements

PROF. F. G. DONNAN, emeritus professor of chemistry in the University of London, has had conferred on him the honorary degree of D.Sc. of the National University of Ireland.

DR. MARY EVELYN LAING MCBAIN, formerly of the University of Bristol and now of Stanford University, California, has been elected national president of the American Women's Chemical Honor Society, Iota Sigma Pi, for the new triennium. The Society comprises 2,500 women chemists. The new secretary is Dr. I. Macy Hoobler, director of the Research Laboratory for the Children's Fund of Michigan.

A UNIVERSITY OF POLAND ABROAD was instituted at a meeting held in the Polish Library, Paris, on December 1.

IT is reported in *The Times* that many of the staff and students of the University of Poznan are being held under arrest as hostages. It is believed that the intention is to repress Polish culture and science in this overwhelmingly Polish province.

THE University of Bern has awarded the first international prize for researches on encephalitis to the Italian neurologist, Dr. Beppino Disertori.

THE January meeting of the Pathological Society of Great Britain and Ireland will be held on January 12 in the Department of Pathology at Cambridge and not at Guy's Hospital.

THE London Scientific Film Society proposes to open its 1939–40 season early in the New Year. The Society would be glad to hear from readers of NATURE of films on scientific subjects, either completed or in the process of production, which could be considered for inclusion in the Society's programmes. Applications for membership should be sent to the Secretary, L.S.F.S., 30 Bedford Row, London, W.C.1. The subscription for the season is 10*s*. or 15*s*., the higher rate entitling the subscriber to the better seats at the shows of the Society.

ERRATUM.—Referring to his communication entitled "A Peculiar Phenomenon Observed in Larval Populations of the Flour Beetle *Tribolium confusum* Duv.", Prof. John Stanley writes that the appearances of the various larval instars as indicated in Fig. 1 were given incorrectly in his original communication. They should read as follows: first instar 6·04 days, second instar 8·47, third instar 12·10, fourth instar 15·13, fifth instar 18·40, sixth instar 21·74.

LETTERS TO THE EDITORS

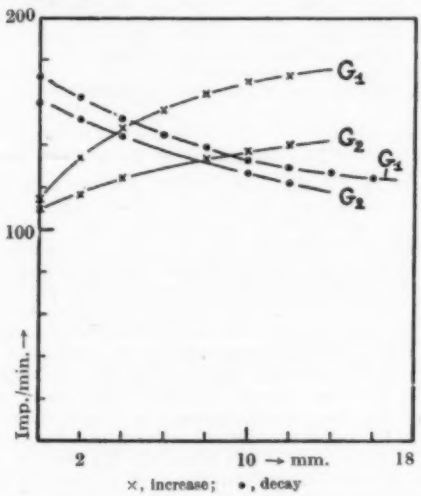
The Editors do not hold themselves responsible for opinions expressed by their correspondents. They cannot undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.*

IN THE PRESENT CIRCUMSTANCES, PROOFS OF "LETTERS" WILL NOT BE SUBMITTED TO CORRESPONDENTS OUTSIDE GREAT BRITAIN.

NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 1051. CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

Radioactive Gases Evolved in Uranium Fission

IN this letter, a brief account is given of the preliminary results of an investigation of the radioactive gases evolved in the fission of uranium nuclei. This investigation was commenced this summer but was interrupted by the outbreak of the War. Even if the results so far obtained are not more complete than those obtained in the meantime by other investigators[1], it may still be of interest to describe the method employed, which follows somewhat different lines.



The radioactive gases evolved in the fission process were carried by a circulating stream of an inactive gas through two Geiger-Müller counters placed in succession. The time lag of the arrival of the gas in the two counters could be varied within wide limits by means of a system of capillary glass tubes of various bores placed in parallel and fitted with stopcocks. The magnitude of the lag was ascertained by separate experiments in which actinon or thoron was circulated. As a carrier gas, acetone vapour at a pressure of 10 mm. mercury was used because of its favourable properties for the working of the counters. The circulation was kept up by means of a Vollmer glass pump.

The uranium vessel, containing about 30 gm. of uranium oxide (U_3O_8), was surrounded by paraffin and provided with a well to allow introduction or removal of the neutron source, which consisted of about 30 mgm. of radon + beryllium. In the experiments, the counting rate of both counters was recorded for a period of time immediately following the commencement or cessation of irradiation. Typical results, using a time lag between the counters of 15 sec., are shown in the accompanying figure, from which it may be seen that the curves obtained for increase and for decay are almost complementary, and indicate several periods, of which some are of the order of a minute, while others are evidently much longer, giving rise to a residual activity almost constant within the time of the experiment.

The shorter periods were estimated from a decay curve obtained in a separate experiment, in which the flow of gas was stopped at the same time that the source was removed, and the records of the two counters at any subsequent time simply added. This gave two periods of about 30 sec. and 4 min., the ratio between the rates of production of the corresponding gases being estimated as 1·82. (Glasoe and Steigman (*loc. cit.*) find two gaseous products of uranium fission of periods 30 sec. and 5 min., of which the first transforms into a product of 3 min. period. It is possible that the period of 4 min. found in our experiments results from a combination of the periods 3 min. and 5 min.)

A test of these estimates was further obtained by calculating from them the values of the ratio between the counting rates of the two counters for steady flow with the various circulating periods obtained by inserting different capillary tubes in the circuit, and comparing the calculated values with the values measured 12 min. after the beginning of the irradiation. This interval of time is not quite sufficient for complete equilibrium to be established, but, on the other hand, it is sufficiently short compared to the periods of the long-lived transformation products to ensure that the values obtained do not depend on the formation of these products to any appreciable extent.

Assuming that the radioactive gas consists only of the two short-period components of decay constants λ_1, λ_2 produced at the rate of n_1, n_2 atoms per sec., the counting rate in any of the counters can readily be shown to be given by

$$G = n_1 e^{-\lambda_1 \tau} \frac{1-e^{-\lambda_1 \theta}}{1-e^{-\lambda_1 T}} + n_2 e^{-\lambda_2 \tau} \frac{1-e^{-\lambda_2 \theta}}{1-e^{-\lambda_2 T}},$$

where τ is the time taken by the circulating gas to travel from the uranium container to the counter in question, θ the time taken by the gas to flow through the counter, and T the period of the whole circulation process.

In the table are recorded the counting rates, G_1, G_2,

$\tau_2 - \tau_1$	G_1	G_2	$G_1 : G_2$	$(G_1 : G_2)$ calc.
15 sec.	108	63	1·72	1·31
50 sec.	94	45	2·09	2·01
2 min.	52	24	2·15	2·10
3 min.	42	21	2·00	2·01

for the two counters measured 12 min. after the beginning of the irradiation for four capillary tubes corresponding to values of the time lag $\tau_2 - \tau_1$ between the counters stated in the first column.

The agreement between the experimental and calculated values for the ratio $G_1 : G_2$ is seen to be very good except for the fastest circulation, for which the calculated value depends mostly on the shorter period and on the short time-lag, the determinations of which are the least precise.

L. WERTENSTEIN.

Miroslaw Kernbaum Radiological Laboratory,
Warsaw Society of Sciences,
At Turczynek, near Warsaw. Sept. 24.

[1] Hahn, O., and Strassmann, F., *Naturwiss.*, **27**, 163 (1939). Heyn F., Aten, A., and Bakker, C., NATURE, **143**, 516 and 679 (1939). Glasoe and Steigman, *Phys. Rev.*, **55**, 982 (1939).

Baade and Zwicky's Theory of Cosmic Rays, and the Helium Content of Beryls

PANETH and co-workers[1,2] have discussed the possibility that cosmic radiation may have produced the helium found in beryls by disintegration of beryllium nuclei, and they give experimental evidence that to do this the intensity would need to be at least sixty times greater. However, to reject cosmic radiation as a possible cause, on the experimental evidence, requires the assumption that, during the life-time of the beryls, the cosmic radiation has had its present intensity, whereas if the theory of Baade and Zwicky is true this is not so. These authors[3] have suggested that cosmic rays are produced at the flare-up of super-novæ. These, of which ten or so have been observed during recent years, rapidly reach a peak of brightness some 20,000 times that of the sun, lasting two or three days. During twenty-five days of maximum brightness they each emit, on the average, as much visible radiation as the sun does in 10^7 years, and after a life of a year or so they become faint stars[4]. They suggest that Tycho Brahe's nova of 1572 was a super-nova occurring in our Milky Way system. Zwicky estimates their frequency of occurrence as one per stellar system per 600 years[5]. They estimate that during its brief life a typical super-nova emits from 10^{13} to 10^{14} ergs, almost all in cosmic rays, and by averaging throughout the heavens they calculate a cosmic ray flux at the earth's surface of the same order of magnitude as the observed, namely, 3×10^{-3} ergs/cm.^{2} sec. However, they point out[3] that a super-nova occurring in the Milky Way 30,000 light years away would, for a short time, produce a cosmic ray flux at the earth some 10,000 times greater.

Evidently, if this theory is true, when considering the production of helium in beryls by cosmic rays, we must take not only the present cosmic ray flux into account, but also the average value due to one super-nova in the galaxy each 600 years. Let us assume that, in the past, super-novæ have occurred throughout the galaxy in proportion to the present density of visible stars. Then from Kapteyn's star distribution, as given by Jeans[6], I calculate the mean value of $1/D^2$, D being the distance from the earth to each super-nova, to be 4×10^{-9} (light years)$^{-2}$. An emission of 10^{54} ergs at the corresponding distance gives an energy at the earth's surface of 2×10^9 ergs/cm.^{2}, account being taken of the fact that a point on the earth can see only half the heavens. This equals the energy received in about 2×10^4 years at the present rate, so that, averaged over 600 years, the average rate of cosmic ray reception is about 35 times the present rate.

In view of the uncertainties of this type of calculation, it seems possible that the theory of Baade and Zwicky and the *experimental* data regarding the helium content of beryls are compatible. However, there is a theoretical difficulty which is pointed out by Fay, Glückauf, and Paneth[2]. The cross-section of the beryllium nucleus for disintegration by cosmic ray particles and quanta would need to be far greater than that predicted by the quantum theory either for photons or fast electrons, but as the quantum mechanics is inadequate to describe other qualities of cosmic radiation, perhaps this theoretical difficulty is not conclusive.

The suggestion that cosmic radiation has played any appreciable part in the production of biological effects, such as mutations, has also been discarded because of the small intensity. If Baade and Zwicky's theory is true, this conclusion also will need reconsideration.

JOHN READ.

Mount Vernon Hospital,
Northwood, Middlesex.

[1] Glückauf and Paneth, *Proc. Roy. Soc.*, A, **165**, 229 (1938).
[2] Fay, Glückauf, and Paneth, *Proc. Roy. Soc.*, A, **165**, 238 (1938).
[3] Baade and Zwicky, *Proc. Nat. Acad. Sci.*, **20**, 259 (1934).
[4] Baade and Zwicky, *Astrophys. J.*, **88**, 411 (1938).
[5] Zwicky, *Astrophys. J.*, **88**, 529 (1938).
[6] Jeans, "Astronomy and Cosmogony", 15 (1928 edition).

"The Relativity of Time"

PROF. H. DINGLE has put forward[1] the view that, while it is correct to deduce the "Fitzgerald contraction" of moving bodies from the Restricted Principle of Relativity, it is incorrect to deduce the slowing down of moving clocks. His main ground is that the second statement is meaningless, because a clock is not a well-defined measuring instrument. If, for example, it takes the form of a stream of equal grains of sand falling regularly in an hour-glass, the time elapsed may be measured equally well by the *number* of fallen grains, N_1, or by their total *mass*, N_2, or by their total *volume*, N_3. Since mass and volume have different transformation laws for moving axes, Prof. Dingle infers that N_1, N_2, and N_3 also have different transformation laws, some showing the retardation and others not.

It this argument is intended to show a real difference between kinds of clocks, it must mean that if two hour-glass clocks are synchronized and moving together, and if one contains a counting apparatus and the other an apparatus for finding the mass of the fallen sand, then although at any instant they show the same reading for an observer relatively at rest, they show different readings for a moving observer. This is clearly not true, if the distance between the clocks is negligible: if the two dials look the same, at any given instant, to one observer, they look the same to all, no matter what mechanism is behind them. What appears to have been overlooked is that the sand and the measuring apparatus both form part of the clock, and therefore move together: the mass involved is the rest mass, and its effect on the transformation law is *nil*. To obtain Prof. Dingle's transformation law the mass of the moving sand would have to be measured by the stationary observer, an arrangement which can scarcely be called a "clock".

In any event, if it is equally legitimate to read a sand-clock by counting grains and by weighing them, it must also be equally legitimate to read a measuring rod by counting its divisions or weighing a piece of it, so that any difficulties on this score about clocks will be paralleled by difficulties about rods. The problems of a logical theory of measurement appear to be symmetrical with respect to space and time.

M. H. A. NEWMAN.

St. John's College,
Cambridge. Nov. 27.

[1] NATURE, **144**, 888 (1939).

I CANNOT agree with Mr. Newman that an instrument which measures time in terms of the mass of fallen sand is not a clock. If such an instrument is passed by a recognized observatory, I should be glad to know on what authority Mr. Newman would reject it. If it is accepted, then the mass must be measured, directly or indirectly, whenever it is used, whether moving or at rest. A consideration of what an observer would see on a dial is not sufficient to determine such a measurement, as perhaps the following example will show most convincingly. Suppose we wish to find how mass varies with velocity. Insert a body in an apparatus which indicates its mass by a pointer reading on a dial. Now recede from the apparatus with velocity, v. So long as the dial can be seen its reading will, clearly, appear the same. Hence if Mr. Newman is right, mass is invariant. It is not "equally legitimate to read a measuring rod by counting its divisions or weighing a piece of it", because the standard of space measurement in physics is defined as the length, and not the weight, between two fixed marks.

I should add that I did not say that "it is correct to deduce the 'Fitzgerald contraction' of moving bodies from the Restricted Principle of Relativity". The Restricted Principle of Relativity is an expression of the Fitzgerald contraction.

HERBERT DINGLE.

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London, S.W.7.

Flame Method of Spectrochemical Analysis

UNDER the present troubled conditions there is no prospect of Dr. F. Majewsky's publishing in the near future his six months' work here ending August 1938. I therefore wish to place his main results on record.

His main work consisted in improving and adapting for routine use Ramage's flame method of spectrochemical analysis. Ramage[1,2] burnt a small quantity (usually 50 mgm.) of powdered plant material rolled in filter paper in an oxy-coal-gas flame in front of a spectrograph. Reproducibility of results depended on the uniformity of feeding the roll into the flame. This was made difficult by the roll bursting into flame just outside the oxy-coal-gas flame.

The difficulty was overcome by raising the roll to a sufficiently high temperature to drive off inflammable gases and carbonize it before burning it in the oxy-coal-gas flame. This improvement alone resulted in increased reproducibility of results and increased sensitivity of the method.

We affected a further improvement by combining with the heat treatment immersion in ammonium chloride vapour to convert the minerals into their chlorides. This resulted in an increased sensitivity which varied from thirty-fold for calcium, the chloride of which is much more volatile than the carbonate, to nil for potassium, the chloride and carbonate of which are about equally volatile.

Dr. Majewsky was able to burn a roll treated in this way always in 75 seconds, whereas untreated ones were consumed in about 50 seconds, but the actual time varied by some seconds from roll to roll.

Quantitative results were obtained by comparing the unknown spectra with those given by rolls impregnated with known mixtures of salts. A statistical analysis of the results obtained with strawberry leaves showed that the means of two determinations each done in triplicate must differ by 12–18 per cent to have a twenty to one degree of significance. This degree of accuracy is sufficient for many horticultural purposes.

Differences between replicate determinations were much less for solutions than for leaf material, and the apparent amounts of most of the minerals showed parallel variation in the spectra of solutions but less so in those of leaf material. These results suggested that the comparatively small variation between replicates of determinations on solutions was due to faulty standardization of burning, and that the increased variation between replicate results on leaf material was due to lack of homogeneity of the leaf sample. These and other facts raise the hope of a further considerable increase in sensitivity and accuracy.

The comparatively simple and inexpensive method worked out by Majewsky was then used by S. G. Thompson for examining leaf samples sent to East Malling by me from South Africa, and proved adequate for a preliminary survey of the mineral status of fruit trees. The results obtained showed some remarkable agreements with horticultural performances and with diagnosis by plant injection.

As there is unfortunately no prospect of Majewsky's paper being published in the near future, it seems desirable to report briefly his contributions before their importance is masked by the superstructure which we hope to build on them.

W. A. ROACH.

East Malling Research Station,
Kent. Nov. 30.

[1] Ramage, H., NATURE, **123**, 601 (1929).
[2] Ramage, H., NATURE, **126**, 279 (1930).

Surnames and Blood-Groups

As is generally known, very large series of blood-groupings have been made in recent months in connexion with the emergency blood transfusion service. Among these depots, one has about 12,000 cases on record.

As the district is one of recent industrial development associated with immigration, it occurred to us to examine whether the blood-group frequencies are associated with surnames. A group of characteristically Welsh surnames was chosen centred on the eight types, Davis, Edwards, Harris, Jones, Lewis, Morgan, Phillips and Roberts, a selection for which we are indebted to Mr. B. S. Bramwell of the Society of Genealogists. This accounted for 5·2 per cent of our sample.

The percentages of the four blood-groups and the two sexes are shown in the accompanying table.

PERCENTAGES CONTRIBUTED BY THE SELECTED WELSH SURNAMES TO DIFFERENT GROUPS.

	O	*A*	*B*	*AB*
Women	5·4	4·3	5·7	3·8
Men	5·7	5·1	5·9	4·5

It may be observed that in each group the percentage of men is higher than that of women, as might be expected from recent immigration of a number of unmarried men. This difference is, however, not statistically significant. In both cases, however, the percentage is lower in group *A* than in *O*, and again lower in *AB* than in *B*. This difference is quite significant, and confirms the conjecture that recent population movements, even within Great Britain, can lead to significant association between surnames and blood-groups.

There are probably many other places in which empanelling for blood transfusion is now sufficiently active for local heterogeneity to be detected by the same method. Local surname frequencies may be obtained rapidly from telephone directories, and more thoroughly from marriage registrations, of which the Society of Genealogists has a large collection.

R. A. FISHER.

Galton Laboratory,
(at Rothamsted).

JANET VAUGHAN.

Emergency Transfusion Depot.

Human Origins and Taboo

IF we think of the evolution of man from some anthropoid stock as the evolution of mainly instinctive (innately conditioned) behaviour into mainly customary (socially conditioned) behaviour, we can both see the possibility of the formation of a larger group than the family one characteristic of extant anthropoids and can relate the said possibility to the facts of taboo—and totemism.

It is commonly and plausibly assumed that the reason why anthropoids do not form larger groups than family ones is the difficulty the larger group would have in finding sufficient food. This difficulty would not arise to the same degree in the case of anthropoids whose behaviour-habit was becoming less instinctive, more customary. The more variegated the dietary customs of family-groups of such a species became in course of ages, the more possible it would be for such groups to combine permanently together without undue strain on the food-resources of the larger group thus formed. It is a matter of pooling experience. When two heads began to be better than one, *Homo sapiens* was in sight.

Customary behaviour is initiated by individuals acting consciously in a novel manner, making a habit of novel and 'agreeable behaviour' and making a negative habit of novel and 'disagreeable behaviour'. In general, the agreeable behaviour *is* viable and the disagreeable *is* unviable. But accidents of conditioning occur in Nature as they occur, not as accidents, in the experimental psychologist's laboratory. A dog can be conditioned to regard anything whatever as 'taboo', so to speak; it is merely a matter of administering some unpleasantness concomitantly. Similarly, in a state of Nature negative customs *could* be formed by accidents of conditioning in regard to objects suitable for food, and it is almost a statistical necessity that our family-groups of anthropoids during the ages while, *as* family-groups, they were evolving their respective customary diets, should have formed one or more such negative customs. There would be nothing to distinguish these 'mistakenly' conditioned negative customs for their 'owners' from customs normally conditioned by disagreeable experience until *after* families were combined in larger groups. Even then we are still a long way from the name and concept of 'taboo' and from totemistic theories of food-taboo practices and social organization, but all that follows easily enough.

This hypothesis is an application of my "Novius Organum" (Longmans, 1931), namely, the assumption of 'nature as habit' in a sense of 'habit' quite the reverse, in relation to 'mind', of Hering's and Butler's notion of 'habit'.

J. C. MCKERROW.

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Dec. 4.

Metaplasia and Adenoma-like Changes in the Uterus of Rats Injected with Sex Hormones

SQUAMOUS metaplasia in the uterine epithelium can be considered as the first stage of pre-cancerous changes. In a previous publication[1], we have given the literature on the subject and have described our own experiments, which showed that metaplasia in the uterine epithelium, produced by injections into the rats of œstrogenic hormones, can be decreased or prevented by the simultaneous administration of progesterone, the hormone of the corpus luteum.

In another paper[2], on the basis of a few experiments only, we have suggested that male hormones, when injected simultaneously with œstrogens, might influence the metaplastic changes.

We have now completed a series of experiments on 105 normal or ovariectomized rats. The animals were injected for 2–3½ months with œstradiol dipropionate or benzoate-butyrate (0·018–2 mgm. a week) alone, or simultaneously with male hormones (androsterone 7·5 mgm., testosterone propionate 2·25–7·5 mgm., and testosterone dipropionate 7·5 mgm. a week). In one experiment progesterone (4·5 mgm. a week) was given in addition to œstradiol dipropionate and testosterone propionate. The results obtained can be summarized as follows:

(1) The percentage incidence of the metaplastic changes may be the same in the rats injected with œstrogens as in those injected with both œstrogens and male hormones.

(2) With the doses used, however, adenoma-like changes in the uterine glands and the most severe degree of squamous metaplasia of the uterine epithelium were found only in the latter group of rats.

(3) The addition of progesterone considerably decreased or in most cases prevented the metaplastic changes.

(4) The results obtained add weight to the suggestion that disturbances of the ratio of the male and female sex hormones, simultaneously present in the organism of either sex, may be an important factor in the occurrence and development of some types of neoplastic growths.

V. KORENCHEVSKY.
K. HALL.

Lister Institute of Preventive Medicine,
London, S.W.1.
Dec. 1.

[1] Korenchevsky, V., and Hall, K., *J. Obst. and Gynæc.*, **45**, 22 (1938).
[2] Korenchevsky, V., Hall, K., and Burbank, R., *Biochem. J.*, **33**, 372 (1939).

Effect of Œstrogens on the Pouch of the Marsupial *Trichosurus vulpecula*

Trichosurus vulpecula, the common Australian opossum, has a well-developed pouch which shows marked reactions towards the administration of œstrogens. After the injection of small doses of œstrogen (200–1,000 I.U.), development of the pouch and mammary glands becomes evident, particularly in sexually immature animals. Furthermore, hyperplasia of the pouch muscles is noted as well as the secretion of a pigment which is deposited within the pouch and which stains the hairs a deep orange within the pouch as well as those around it. After the administration of one or several moderately large doses of œstrogen (1,000–10,000 I.U.), hyperplasia and hypertrophy of the muscles of the pouch occur, and the pouch decreases in size. After the administration of a single large dose of œstrogen (50,000–1,000,000 I.U.), the hypertrophy and hyperplasia of the pouch muscle become marked and it goes into a state of contraction which is accompanied by an almost complete disappearance of the pre-experimental pouch.

If the injections of large doses of œstrogen are maintained, the contraction of the pouch remains permanent, but the animal dies from the action of the hormone on the internal reproductive organs. This end result is similar in animals which possess small or large pouches pre-experimentally; but it necessarily becomes more obvious in animals which had large pouches before injecting the œstrogen. This reaction indicates that the muscle of the pouch, which is voluntary muscle, is contracted by œstrogen.

A. BOLLIGER.
A. CARRODUS.

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Nov. 17.

Severe Mortality of *Mactra corallina cinerea* (Montagu) off the Lancashire Coast

I WAS informed by Mr. J. H. Duggan that enormous numbers of molluscs had been thrown up on the coast between Southport and Hightown on October 28. They then formed a continuous belt averaging six feet in width and ten inches in depth at the crest, extending nine miles from Southport towards Hightown. The majority were, at this time, alive.

I visited the area on November 1 and found that the tides since October 28 had scattered the molluscs over a zone averaging twenty-five yards in width. They were arranged in drifts parallel with the high water mark and usually five in number, the heaviest deposit being in the most shoreward drift. In many places this drift was five inches deep and five feet wide.

Most of the molluscs, at this time, were dead, but in the deeper drifts the ones underneath were still alive, having been protected from the wind and sun by the upper ones. The fact that no deposits were found in which all or most were alive suggests that none had been cast up since October 28.

Only one species of mollusc was present, namely, *Mactra corallina cinerea* (Montagu), and all were small specimens, averaging 0·9 in. in length, and obviously the same year's spat.

It was found that one cubic foot of the drifts contained approximately 3,600 specimens of Mactra, so that Mr. Duggan's figures imply a belt nine miles long, six feet wide and, say, seven inches average depth, from which a conservative estimate of the mortality of the Mactra can be obtained. This figure is in the order of 600 millions and, as Orton has stated[1], represents a tremendous loss in fish food.

Two previous records of great numbers of molluscs being cast on to this beach have been made: Chaster[2] recording *Cardium echinatum* being washed up in great numbers in January 1891, and Orton[1] recording great mortality of *Abra alba* and *Donax vittatus* in November 1929.

Orton suggested that the mortality was due to a certain wave action set up by a combination of the action of spring tides and a strong inshore wind, which washed out the organisms in the surface layer of the sea bed. In the present case, however, the mortality occurred at the time of the spring tides, but an offshore wind was prevailing.

It is interesting to note that on each of these three occasions a different species was cast up. This might be due to one of two alternatives: either the population of the sea bed off the shore has changed in the time between each of these events, or a different area of the sea bed has been affected by the tides on each occasion.

G. E. WILLIAMS.

Department of Invertebrate Zoology,
Liverpool Free Public Museums.
Nov. 20.

[1] Orton, J. H., NATURE, **124**, 911 (December 14, 1929).
[2] Chaster, *Southport Soc. Nat. Hist.*, **1** (1892).

Chitin Content of the Mandible of the Snail (*Helix pomatia*)

THE presence of chitin in the above-mentioned organ has been indicated so far by means of colour reactions only, probably owing to the lack of material. During the course of another investigation, we came into the possession of 650 mandibles (1 gm.), and an acetolytic breakdown experiment was carried out. After boiling with dilute alkali and hydrochloric acid, the remainder weighed 70 mgm., and yielded upon the application of Bergmann's method 8 mgm. of colourless needles which were identical with octa-acetyl chitobiose: m.p. 290°, nitrogen content 4·4 per cent. The experiment shows that the presence of chitin can be proved in even minute amounts of natural substances.

G. TÓTH.
L. ZECHMEISTER.

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Nov. 15.

Potential Hosts of Potato Viruses in Garden and Field

IN the spring and summer of 1938 one of us (R. N. S.) was working on potato leaf roll with the object of producing an attenuated strain of the virus. To this end, attempts were made to convey leaf roll not only to members of the Solanaceæ but also to a wide range of unrelated genera. Two successes were secured by means of grafts, one with Matthiola, the other with a garden Campanula, both of which behaved as carriers.

Encouraged by these results we have explored, during 1939, the possibility of such infections occurring in plants grown as field crops. In particular, we attempted to infect cruciferous weeds and cultivated

Brassicæ both by means of graft and by the agency of the aphid *Myzus persicæ*. We succeeded in conveying leaf roll twice, once through a turnip and thence to a President potato, in both instances by graft; and again through a Brussels sprout and on to a President potato, both by means of the aphis *Myzus persicæ*. Neither hosts showed any symptoms, but the virus which was recovered on the Presidents produced a typical leaf roll in the first case and a poorly developed and ambiguous syndrome in the second.

We were from the start, however, confronted with an unexpected complication: in a large number of cases the virus carried over to the potato and thence to tobacco or *S. glutinosa* plants from infected Brassicæ or other foreign host was the *Y* virus (Sol. Virus 2, K.M.S.), and not leaf roll. Careful checking of all controls and examination of our potato leaf roll sources showed that it was these latter which were harbouring the *Y* virus, notwithstanding that they had been exhibiting acute leaf roll for nearly twenty years without a sign of the usual *Y* virus symptoms.

Our researches have proved that the *Y* virus can be carried by turnips, cabbages, kale and Brussels sprouts without symptoms, and that from them it can be conveyed to potatoes by graft or by means of *Myzus persicæ*, and thence to tobacco or *S. glutinosa*. In addition, we have shown that red clover, the garden pea and bindweed may be infected with the *Y* virus by means of *Myzus persicæ* without producing symptoms. The Brassicæ are frequently the overwintering hosts of *Myzus persicæ*: may it be that they and the well-nigh ineradicable bindweed may also act as reservoirs for these destructive potato viruses during the winter months?

REDCLIFFE N. SALAMAN.
W. R. S. WORTLEY.

Potato Virus Research Station,
Cambridge.
Nov. 20.

A Bacterial Disease of Forsythia

A BACTERIAL disease has appeared in an East Anglian nursery on bushes of *Forsythia spectabilis* and *F. intermedia*. When, early in the year, the two-year-old branches are removed to the forcing house, the flower buds remain dormant or open imperfectly. Sometimes only a few twigs on a branch are affected; more often the branch as a whole remains dormant. Examination of the cut end of the shoot shows a stain in the wood, usually crescent-shaped, and varying in colour from scarlet to dark brown. At the time of cutting, the diseased branches cannot be distinguished superficially from healthy branches, but the stain in the wood betrays the presence of the disease. On any bush, healthy and diseased shoots arise from different stools. Excision of diseased branches (but not of the diseased stools) has been practised, but the bushes continue to die back, indicating that the disease can spread from the diseased to the healthy stools.

From stained wood a bacterium was readily isolated; this produced green fluorescence on beef-infusion agar and in Uschinsky's solution. Its reactions in culture media show it to be closely related to *Pseudomonas syringæ*. The Forsythia organism was inoculated into the wood of young Forsythia bushes growing in pots, and produced a dark stain in the wood; the following spring the flower buds opened normally. Inoculated into swelling flower buds, the organism caused a delay in opening of about a week compared with wounded controls. When inoculated into young succulent lilac and Forsythia shoots, blackened lesions appeared; shortly afterwards the shoots died. *Ps. syringæ* was inoculated into the wood of Forsythia bushes but produced no stain in the wood and did not affect the opening of the flower buds. When *Ps. syringæ* was inoculated into young succulent shoots of Forsythia, black lesions developed and shortly afterwards the shoots died and turned black.

It thus seems probable that the organism isolated from Forsythia belongs to the *Ps. syringæ* group. Wormald[1] records a disease of Forsythia, probably caused by *Ps. syringæ*, the symptoms of which were elongated black lesions on the shoots and spots on the leaves.

G. METCALFE.

Botany School,
Cambridge.
Dec. 1.

[1] Wormald, Annual Report E. Malling Res. Sta., 1935 (Sect. III), p. 145.

Excretion of Thiamin and Biotin by the Roots of Higher Plants

THE fact that soil in the immediate vicinity of plant roots supports a much higher microbial population than that existing outside the plant's zone of influence has been recognized for many years. Although it has been suggested that 'root excretions' account for this effect, these hypothetical exudates have never been identified, nor has their mode of action been satisfactorily explained. In studying the relation of plants to soil-borne diseases, it was considered desirable, therefore, to examine the possibility that excretion of minute amounts of bacterial growth factors by the growing plant might be a fundamental factor in determining the character of the rhizosphere microflora.

One hundred representative bacteria were isolated from each of the rhizospheres of Bison and Novelty flax, after three weeks' growth in uniform soil under greenhouse conditions, and from the rhizospheres of two varieties of tobacco grown in the field. A similar number of control organisms was isolated in each case from soil outside the root's zone of influence. Each of the isolates was inoculated into two media, one containing glucose, potassium nitrate and inorganic salts, and the other containing, in addition, cysteine 50 mgm., *m*-inositol 100 mgm., thiamin 100 γ, β-alanine 100 γ, nicotinic acid 100 γ, and biotin 0·5 γ, per litre. All growth-substances were used in pure form except biotin, a concentrate of which was prepared by the procedure of Kögl and Tonnis[1] and shown to be approximately 0·5 per cent pure[2].

Results in every case showed that those organisms dependent for their development on a supply of previously synthesized growth-factors were markedly more abundant in the rhizosphere than in control soils[3], suggesting that the plant may excrete the necessary factors for their nutrition. In testing the growth-factors separately on twenty-five organisms selected from flax and tobacco rhizospheres, for which the more complex medium was essential, all were found to require either thiamin or biotin or both, but in no case did inositol, β-alanine, or nicotinic acid show any growth-promoting properties.

Although these findings indicate that the plant possibly exerts at least a part of its 'rhizosphere effect', through ability to excrete thiamin and biotin, more direct evidence to support this tentative assumption was desired. Seeds of Novelty and Bison flax were sterilized, and germinated in petri plates. After four days at 28° C. the seed-coats were carefully removed from the cotyledons and the seedlings planted in 8-in. test tubes containing 15 ml. sterile nutrient solution. A circular disk of cheese-cloth supported by short lengths of glass tubing held the plant at the surface. Following one, two and three weeks of growth, the nutrient solutions from five tubes, containing one plant per tube, after being checked for sterility, were combined and concentrated in volume to 10 ml.

The plant excretions were assayed for thiamin by the growth response of *Staphylococcus aureus* in a medium containing all essentials except the substance to be determined[4]. The presence of thiamin was readily detectable by this method; the excretion from five Bison flax seedlings was 0·23 and 0·64 gammas, and from five Novelty flax 0·24 and 0·64 gammas after one and two weeks of growth respectively. The appearance of inhibitory material in the plant excretions after two weeks interfered with this assay on older seedlings.

Biotin was assayed by the response of *Rhizobium trifolii* (Wisconsin Strain 205) according to the technique described by West and Wilson[3]. The amounts of this factor excreted in one, two and three weeks were in the neighbourhood of 0·06, 0·25 and 0·21 gammas, and 0·08, 0·20 and 0·20 gammas for five Bison and Novelty flax seedlings respectively. While it is recognized that the accuracy of these results depends on the validity of the assay methods concerned, it is believed that the specificity of these microbiological tests has been satisfactorily established for the strains employed[2,4,5,6,7].

From these observations it appears that the excretion of significant amounts of thiamin and biotin from young roots of higher plants occurs normally, even under sterile conditions, and accounts, at least in part, for certain quantitative and qualitative differences characteristic of the bacterial flora of the rhizosphere.

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Points from Foregoing Letters

L. Wertenstein was investigating the radioactive gases evolved in the fission of uranium at the Miroslaw Kernbaum Radiological Laboratory of the Warsaw Society of Sciences when Poland was invaded. Writing from Turczynek, near Warsaw, he describes some of the results he had obtained. The radioactive gases were carried through two Geiger-Müller counters placed in series and the time lag of arrival of the gases in the counters could be varied by a system of capillary tubes. Typical curves indicate bodies of period of the order of a minute, and others of much longer period, giving almost constant residual activity within the time of experiment.

J. Read points out that if Baade and Zwicky's theory of cosmic radiation is true, the experimental evidence regarding the helium content of beryls is not incompatible with the assumption that this helium was produced by cosmic rays. The possibility of biological effects due to cosmic rays would also need reconsideration.

M. H. A. Newman questions Prof. H. Dingle's view that the current doctrine of the slowing down of moving clocks in relativity is incorrect. Prof. Dingle, in reply, maintains that the clocks described by him are legitimate, and that the uncorrected dial readings referred to by Mr. Newman are not relevant to the problem.

F. Majewsky and W. A. Roach have rendered Ramage's flame method of spectrochemical analysis more sensitive and the results more reproducible. The roll containing the sample is introduced into ammonium chloride vapour to drive off volatile gases and convert the minerals into their chlorides before the roll is burnt in the oxy-coal-gas flame.

J. C. McKerrow suggests that some anthropoid became man as behaviour became more and more conditioned by custom. Confirmation of this hypothesis, itself based on the view of Nature which he has propounded in "Novius Organum", is found in the facts of taboo and totemism.

Since adenoma-like changes and the most severe degree of metaplasia appear in the uterus of rats only when male hormones are administered in addition to œstrogens, V. Korenchevsky and K. Hall conclude that disturbance of the ratio of the male and female sex hormones may be an important factor in the occurrence and development of some types of tumours.

Heavy mortality of *Mactra corallina cinerea* (Montagu) on the Lancashire coast is reported by G. E. Williams. Comparisons are made with two previously recorded mollusc mortalities on this part of the coast.

R. N. Salaman and W. R. S. Wortley have shown that the cultivated Brassicæ, as well as the garden pea, red clover and common bindweed, may be induced to behave as symptomless hosts of two destructive viruses which affect the potato crop. It is suggested that certain of these plants may serve as virus reservoirs as well as overwintering hosts for the aphid vector.

G. Metcalfe describes a disease of Forsythia, apparently caused by *Ps. syringæ*.

The excretion of thiamin and biotin from young roots of higher plants has been found by P. M. West to be of significance in explaining the occurrence of high numbers of bacteria requiring those growth substances, in the soil adjacent to the root surface.

RESEARCH ITEMS

Rock Art in North Africa

M. RAYMOND VAUFREY has now added to his previous reports on the results of his researches on the rock art sites of southern Oran and their bearing on the origin, affinities and chronology of the north African neolithic, further details of the sites, comparative studies, and full illustration (*Arch. de l'Institut de Pal. Humaine*, Mém. 20; 1939). On four groups of sites, in the mountains of Figuig, Ksour, Géryville and Jebel Amour, the association of a stone industry with these rock-engravings of animal and human figures, an association previously undetected, made it possible to assign this art to a neolithic with Capsian traditions, which is shown to extend to northern Oran and beyond, linking up with the neolithic of the Sahara and a neolithic pluvial period, to which a date is assigned ranging from the middle of the sixth to the middle of the second millennium before our era. In order to test the application of this dating to the North African neolithic with Capsian tradition and the associated rock art of Oran, the comparison, obvious on both geographical and cultural grounds, is made with proto-historic and pre-dynastic Egypt. Here it is found that certain cultural elements in the North African neolithic are to be assigned to the various cultural stages or 'civilizations' now distinguished—Tasian, Badarian, Amratian, Gerzean—dating from at most 6000 B.C. to about 2000 B.C. But whereas these cultural elements or traits appear at various stages in Egypt according to the 'civilization' to which they belong, in North Africa they appear together—a fact which is explicable only on the ground that the North African is 'colonial' in character in relation to Egypt. A possible affinity of certain rock engravings showing a chariot with galloping horses fixes the latest dating at the opening of the Eighteenth Dynasty, 1580 B.C. As regards its racial character, the culture in Oran is linked with the race of Mechta el-Arbi, which has been shown to have Cro-Magnon affinities.

Tardenois Site in Western Scotland

MICROLITHIC sites in Scotland have been discovered chiefly towards the east coast, while the well-known exception of Shewalton Moor, near Irvine, is probably to be assigned to well into the Bronze Age. A newly discovered site at Ballantrae, Ayrshire, described by the Rev. W. Edgar (*Trans. Glasgow Archæol. Soc.*, N.S., **9**, 3; 1939) has so far yielded only the earlier types of microliths and may, therefore, be assigned to the Middle Tardenoisian. The site is situated on the 50-ft. beach extending from Laggan Burn to Lownan Point over a distance of about a mile and a half, with an average breadth of about one quarter of a mile. Two streams intersect the area, which with the Laggan Burn supply an abundance of water. The area is fertile and mostly under the plough. Up to the present, only surface finds have been made, nor has the area been examined where not turned by the plough. So far no evidence of pit-dwellings or occupation floors, or traces of charcoal have been found, though concentrations of implements suggest the activities of craftsmen at localized centres, in two or three instances supported by an abundance of cores. The implements collected include blades in comparatively large numbers, generally of the small battered-back type. The triangular is not frequent, but some crescent-like forms have been found; also micro-burins in numbers, the majority of the usual type; scrapers in large numbers and in different varieties; notched flakes not uncommon; gravers, though rarely, two being 'accommodation pieces'; and cores in abundance, mostly pyramidal.

Origin of the Grasping Movement in Man

PROF. DAVENPORT HOOKER, reporting on research work towards which financial support has been given from the Penrose Fund of the American Philosophical Society (Year-Book, Amer. Phil. Soc., Philadelphia, 1938), states that observations on the development of the grasping reflex in human fœtuses prove the independence of its two phases, finger closure and gripping, as they develop sequentially. Finger closure appears at about 11 weeks of menstrual age as a quick, though only partial, flexion of the fingers, in which the thumb is not involved. Though the thumb may become feebly mobile so early as 12 weeks in response to tactile stimulation of the palm it plays no part in the grasp by 25 weeks—the terminal age of the present observations. Finger closure becomes progressively more complete. At and after 16 weeks, tactile stimulation of the palm usually evokes complete closure. Gripping has first been observed at about the eighteenth week. It continues feeble for the remainder of the age-span studied. Further study may modify the age-levels at which these characteristic responses appear. Up to the present 42 individuals have been studied in a period of six years, the age-span covering from 7 to 25 weeks. It is the second largest series ever studied and the only one documented by objective records, the fourteenth week being exceptionally well covered. An atlas covering fœtal activity from its initiation, about the eighth week, through the 14 weeks stage has been prepared.

Robin Redbreast Pigment in Fowls

MARY E. RAWLES (*J. Gen.*, **38**, 517–431; 1939) grafted small pieces of skin from the head of a 90–96-hour-old embryo robin on to the right wing bud of a 73-hour-old White Leghorn. On hatching, the hosts showed areas of down coloured cinnamon brown on part or all of the right wing. In one case this was later replaced by juvenile contour feathers of a colour typical of the robin. After moulting, the feathers were host coloured. The barbules were of the structure of the White Leghorn. Hence the robin-coloured feathers arose from the host's feather germs and were coloured by melanophores which migrated from the grafted tissue into the epidermal 'collar' of the host's feather germs.

Hybridization and Tumour Formation in Mice

C. C. LITTLE (*Proc. Nat. Acad. Sci.*, **25**, 452–455; 1939) has shown that the first generation hybrid between females of the *C57* race of *Mus musculus*

and males of *M. bactrianus* showed a larger incidence (45·5 per cent) of tumours as compared with that of the parents 14·4 per cent and 3·8 per cent respectively. The parental strains are different in the amount and type of tumour present, but the hybrids have an incidence much greater than the addition of the tumour-tendencies of the parents. Also, multiple tumours in one individual occur in 11·57 per cent of the F_1 and in not more than 1·14 per cent in one parental strain. Internal physiological 'unbalance' increased by hybridization is given as the most reasonable cause for the results.

Vascular Anatomy of the Apple

THE developmental anatomy of two different varieties of apple has been studied by Mary MacArthur and R. H. Wetmore (*J. Pom. and Hort. Sci.*, 17, 218; 1939). The varieties McIntosh and Wagener were chosen, as having the same chromosome number (34), a similar growth period, and distinct shape differences. The McIntosh apple is uniform in shape with very faint angulation and with the stamens basal to medium in the distal depression. The Wagener is unequal-sided, definitely angulated, and with stamens attached higher up. The outline of the primary vascular bundles in the former case is circular, and in the latter lobed, corresponding with the respective shapes of the two fruits. In McIntosh, the ventral lobes of the carpels never unite. The locules are thus never completely separated from the central cavity, leaving the core 'open'. In Wagener, the ventral lobes of a carpel are joined, no opening connects the locule with the central cavity, and the core is thus 'closed'. The ovules of Wagener are arranged longitudinally with one ovule in each half of a locule. In McIntosh they are horizontal and stretch across both halves of the locule or occupy the central cavity. This irregularity in McIntosh is associated with irregularity in the separation and direction of the ovular traces. The authors have examined in detail the anatomy and development of the floral parts, and in particular their ontogeny in relation to the nature of the fleshy part of the fruit. They conclude that this is essentially a fleshy calyx tube or 'floral cup', that is, the consolidated bases of the calyx, corolla and stamens.

Control of Club-root

CLUB-ROOT (*Plasmodiophora Brassicæ*) is normally controlled by correction of soil acidity and adequate crop rotation. Where applications of lime are undesirable or ineffective, as may occur with some horticultural crops, mercuric chloride has been successfully used on a small scale. Chlorinated nitrobenzenes have been tried by Margaret J. Smieton (*J. Pom. and Hort. Sci.*, 17, 195; 1939) as an alternative lacking the objectionable properties of mercury compounds. Seed box experiments on white mustard with mercuric chloride, pentachlornitrobenzene and trichlordinitrobenzene showed that the latter compared favourably with mercuric chloride. The same substance applied at 1·5–3 oz. per sq. yard gave variable control of the disease on cabbages, sprouts and broccoli in outdoor seed beds. Mercuric chloride was, however, most effective. The trichlordinitrobenzene reduced the stand of seedlings when applied in greater amount than 1½ oz. per sq. yard. Substantial control of the disease, though not always equal to that given by mercuric chloride, was obtained by the addition of a small quantity of trichlordinitrobenzene to the dibble hole at the time of transplanting. Pentachlornitrobenzene was less effective except in cases of mild attack, but was less phytocidal than the other substances. All the substances tested were liable to check the growth of the plants. With trichlordinitrobenzene the check was greater when lime was used as a diluent than when chalk or talc was used.

Exchange between Nitrogen Isotopes on Metal Surfaces

FOUR years ago Taylor and Jungers (*J. Amer. Chem. Soc.*, 57, 660; 1935) concluded that both in the synthesis and decomposition of ammonia on an iron surface the rate-determining step was $N_{2(gas)} \rightleftarrows 2N_{adsorbed}$. The correctness of this view has now been investigated by observing the velocity with which the isotopic exchange reaction $^{28}N_2 + {}^{30}N_2 = 2{}^{29}N_2$ occurs on iron and on tungsten surfaces from room temperature to 725° and 900° respectively. The exchange reaction is immeasurably slow below 450°, and even above this temperature is very slow in comparison with the exchange reaction of molecular hydrogen isotopes at the surfaces of hydrogenation catalysts. Reaction is, however, accelerated by the presence of hydrogen. To explain the slowness of the reaction two alternative mechanisms are put forward involving either (*a*) the rupture of valency bonds of adsorbed molecular nitrogen, or (*b*) if the nitrogen is adsorbed as atoms, migration of these atoms over the surface. On either hypothesis the acceleration by hydrogen is readily understood due to formation of imido or amido groups which, in (*a*), would lessen residual valency forces of adsorbed molecular nitrogen and, in (*b*), would diminish the Fe-N forces inhibiting migration. The high activation energy of approximately 50 kgm.-cal. indicates that the adsorption of nitrogen on synthetic ammonia catalysts is true activated adsorption.

Activity Coefficients of Strong Electrolytes

IT is well known that the formula of Debye and Hückel for the activity coefficient of an electrolyte holds only at high dilutions, and for moderate concentrations an empirical term involving the first power of the concentration must be added to obtain satisfactory results. P. van Rysselberghe and S. Eisenberg (*J. Amer. Chem. Soc.*, 61, 3030; 1939) have investigated the consequence of assuming a van der Waals' force of repulsion between ions, and as this is related to the mean distance of closest approach between a positive and a negative ion, which is already contained in the Debye and Hückel equation, the result is a one-parameter formula. A term proportional to the volume concentration and to the cube of the distance of closest approach, and another term proportional to the square of the volume concentration and to the sixth power of the distance of closest approach, are added to the Debye and Hückel expression for the logarithm of the activity coefficient. It is shown that precise determinations of the distance of closest approach can be made only at high concentrations, when the activity coefficients become sufficiently sensitive functions of this parameter. Activity coefficients in 0·001 and 0·01 molar solutions are calculated for several electrolytes, and in eight cases out of fifteen comparison with experimental values is possible and shows very promising agreement. The mean ionic diameters are calculated by the method of least squares.

RECENT RESEARCHES ON EARLY MAN IN CHINA. I

LATE CENOZOIC HISTORY OF NORTH CHINA

P. TEILHARD DE CHARDIN opens a review[1] of the geological and palæontological evidence bearing on the late Tertiary and early Quaternary epochs in northern China by pointing out that, in the course of the past ten years, a continuous outpouring of new facts has necessitated a constant readjustment of number and relative importance of the successive physiographic stages recognizable in that part of the world, which has to be explained periodically.

Thus, the original conception of the Late Cenozoic of China as a massive and continuous formation, in which the lower and uppermost terms only (Pontian Hipparion red clays and the Pleistocene loess) were explicitly distinguished as two separate horizons, was modified through a succession of discoveries by the conception of the "Sanmenian", an intervening polymorphous complex rather vaguely referred either to the Late Pliocene or to the Lower Pleistocene. It soon became more and more clear, however, that several marked differences in species and genera were separating in the so-called Sanmenian the faunas of Nihowan and of Choukoutien, representing a definite faunal and physiographic break, the former being left in the final Pliocene and the latter representing the true Lower Pleistocene of China. The evidence has now become overwhelming that fundamental changes separate the upper (Choukoutien) and lower (Nihowan) parts of the former "Sanmenian".

Although views are still far from definite, they may be expressed provisionally as follows. Notwithstanding physiographic changes, the Equus-Camelus beds of Nihowan and the underlying pre-Nihowan (Middle Pliocene) have lithological and faunistic affinities. Both are lacustrine in facies and both are characterized by the same 'sub-tropical Asiatic' fauna. By this term it is intended to indicate that in the Middle Pliocene two different faunistic blocks were mixing in the forested steppes of north China—one of south-eastern affinities, including an abundance of Cervulids, and another, a peculiar Central Asiatic block, characterized by a harvest of beautiful, mostly strepticere, antelopes, apparently a special antelope province, parallelizing the modern African province, but separate from it since the base of the Pliocene.

The bearing on the present point is that these two blocks were still thriving in North China after the appearance of such forms (horse, bison, camel) as characterize the Villafranchian of Europe. In spite of many important differences in their respective faunas, the Middle Pliocene and Villafranchian (Nihowan) of North China are marked by the same general topography, the same climate, and the same fundamental types of deer and antelope.

These conditions being realized, it is difficult to escape the conviction that a change of the first magnitude occurred between the end of the Sanmenian (Nihowan) stage of deposition and the beginning of the following 'Choukoutien sedimentation', and that this change corresponds to a positive epeirogenic movement rejuvenating the entire Pliocene topography. Supposing that at the end of the Pliocene the whole of the Asiatic plateau has been moving upward, while a few compartments only—Ordos (?), Fenhotrough, Peking plain—sink between the rising blocks of Mongolia, Shansi, Tsinling, etc., then an increasing number of facts, so far overlooked or unexplained, find a natural connexion and easy explanation, among those mentioned being the desiccation of the Pliocene lakes drained by new-cut gorges, the replacement of the lacustrine tilted or faulted sediments by thick loamy fans sloping down in the basins from rejuvenated ranges, the enormous accumulations of Pleistocene sands and silts (Tientsin, 800 metres; Taiyuan, 300 metres), the first appearance of the modern Hwang-ho, and probably the final separation of Japan from the continent.

As a natural consequence the antelopes die, the Malayan deer and Stegodon retreat southward, a western or northern wave brings new types of deer (Euryceroids, Pseudaxis, etc.), and probably from the south with the water-buffalo, man (Sinanthropus) appears.

Still somewhat African-looking up to the end of Nihowan times, Asia was essentially our present Asia at the dawn of the Choukoutien cycle. This proves the positive reality and gives the measure of the post-Villafranchian break in North China.

Among conclusions which follow, it would appear that in North China, as in France and North India, the first appearance of horse (more and more generally accepted by palæontologists as indicating the base of the Pleistocene in the Old World) antecedes clearly the majordiastrophisms which would be the best limit between the Tertiary and Quaternary from a geological point of view; and, therefore, the advantage of keeping the Villafranchian in the Pliocene instead of the Pleistocene should be reconsidered. So far as North China is concerned, the most natural base of the Quaternary is given by the appearance of man on a modernized topography after the Villafranchian.

ORIGIN OF MANKIND[2]

As a result of his researches on the skeletal remains of fossil man found in the cave of Choukoutien, Prof. Franz Weidenreich maintains that the important body of knowledge gained from the numerous specimens of Sinanthropus (structure of the teeth, cranial capacity, variability of type, etc.) call for a radical transformation of our conceptions of the problem of the origin of mankind. The true Anthropoidea on one hand, and the Hominidæ and Australo-Pithecoidea on the other hand, have been derived from a common primitive anthropoid stock. Sinanthropus and Pithecanthropus, representing a pre-human stage of development, belong to the second group. The different specimens of the Neanderthal group represent a higher, and recent man yet a third stage.

Development has been decidedly orthogenetic, and has come about as a combination of primitive and progressive characters. The diversion of mankind into geographic varieties (races) is an old phenomenon

and is traceable so far back as the early stages of development of the Hominidæ. It would be wrong to suppose a polygenetic development of the Hominidæ, as the development of the common group took place only once. But the development has been polycentric, and four centres of the genesis of the Hominidæ can be distinguished—European–Western Asiatic, Middle East African, North Chinese, South-East Asiatic–Sundaic. As the development in these centres took place not at the same time and at different speeds, young and old races are to be found in every stage.

The developmental factors of Lamarckian and Darwinian conception are considered to be of no importance, the essence of evolution being an independent progressive differentiation of the type itself. The phylogenetic development is the result of internal causes, and is, like the ontogeny, an evolution of innate character.

FORERUNNER OF *Sinanthropus Pekinensis*[3]

Certain deductions as to the character of a hypothetical forerunner of *Sinanthropus Pekinensis* are drawn by Prof. Franz Weidenreich from the skeletal material from Choukoutien. The line of argument followed is that Sinanthropus, representing the most primitive hominid known hitherto, and it being possible to connect it with recent man by a continuous line of characteristic types such as Javanthropus, Neanderthal man and the man of Mount Carmel, we may trace a picture, imaginary, but based on ascertained fact, of the forerunner of Sinanthropus in a complete and uninterrupted line of evolution, by attributing to it those specialities which, as we know, have gradually disappeared in the course of human evolution.

Thus, taking the evidence of the brain-case, its main peculiarities in Sinanthropus are the extraordinary lowness, the greatest breadth coinciding with the bi-auricular breadth, thick and far projecting supraorbital tori separated from the receding forehead by a broad and relatively deep furrow, a strong and rounded occipital torus combined with a low inion angle, and finally the location of the foramen magnum in a rather posterior level. The persistence of this bulkiness of superstructure, which in all great apes is a direct and indirect result of the misproportion of the size of the brain-case affording insufficient space for attachment of powerful nuchal and masticatory muscles, but is reduced in extent and bulkiness as the brain-case is enlarged in the course of the evolution of more advanced human types, indicates that in regard to this feature the forerunner of Sinanthropus could not have been very different from the great apes of to-day.

As to the general configuration of the brain-case, neither the relation between length and breadth, nor that between length and height, could have been considerably different from that of Sinanthropus, in whom these ratios are about the same as in the great apes.

The character of the forerunner is also suggested by the teeth, in which Sinanthropus has several features in common with the apes, but differs completely from recent man. As human evolution proceeds, the teeth undergo a reduction in size, height, length proportions and a simplification of their patterns. It is probable, therefore, that the characteristics of the teeth were still more developed in the forerunner. The canines, however, require special consideration, and there are indications that the crowns of both upper and lower canines may have been much higher in the forerunner, as is characteristic of the anthropoids of to-day. Further, the dental arcade of Sinanthropus suggests that in the forerunner the jaws were more salient.

All these facts thus outlined lead to the conclusion that the immediate forerunner of Sinanthropus was an anthropoid primate the general appearance of which with regard to skull, jaws and teeth did not differ in principle from that of female anthropoids of to-day. To know the special relations of this anthropoid-like hominid to the ancestor of recent anthropoids, we must compare Dryopithecus or Sivapithecus with Sinanthropus; but in actual fact the closest resemblance is found in neither of these, but in Australopithecus, which, therefore, must be regarded as representing an anthropoid with some relation to the anthropoid forerunner of Sinanthropus.

Such other parts of the skeletal structure of Sinanthropus as are known—or rather the collar-bone and the humerus fragment specifically—indicate that his immediate forerunner probably had abandoned the arboreal mode of living; and judging from the size of brain-case, jaws and teeth, could not have been a pygmy.

The question as to which of the anthropoids of to-day Sinanthropus bears the closest resemblance is not so easily answered as may be imagined. In some peculiarities of the teeth he approaches the gorilla (cingulum), in others (for example, wrinkles) the chimpanzee, and then again the female orang in 'taurodontism'. But when reviewed in general among all anthropoids, recent and fossil, known hitherto, Australopithecus seems to be the closest relative of Sinanthropus and his assumed forerunner.

DURATION OF LIFE IN FOSSIL MAN IN CHINA[4]

Investigation of the evidence of individual age in the remains of fossil man discovered at Choukoutien corroborates the conclusion at which Prof. H. Vallois arrived in his study of similar evidence relating to Neanderthal man, that only rarely, if ever, was death due to natural causes, and that in consequence the duration of life was not prolonged. In the Sinanthropus population, now numbering approximately thirty-eight individuals, fifteen, or 39·5 per cent, were children up to the age of fourteen years old, three skulls may have belonged to individuals aged less than thirty years old, three may range between forty and fifty years, and only one skull, that of a woman, unfortunately in a fragmentary condition, may have been that of a really old individual of more than fifty years, or even sixty years of age.

It is interesting to note that in the Pithecanthropus group, the nearest relatives to Sinanthropus, complete fusion of the sutures of the skull cap points to an age of more than fifty years, while the recently discovered third skull (1938) belongs to a juvenile.

It must be remembered that these conclusions as to age are subject to the reservation that it is assumed that the eruption of the teeth and the fusion of the sutures correspond in time to the respective processes in modern man, though it is known that in the anthropoids they take place at a much earlier age than in man. This, however, would only serve to confirm the conviction that the actual duration of life in Sinanthropus was shorter than in modern man.

With regard to late palæolithic man of the Upper Cave, of the seven individuals there were three

juveniles, a fœtus or new-born infant, a child of about five years, and one of an age of fifteen to twenty years. Of the four adults, two, probably women, may have been slightly more than twenty years of age; the third is indeterminate, but probably not advanced in years, and the fourth was an old man of at least sixty years. Thus in the late palæolithic population also old age was seldom reached.

In both groups, Sinanthropus and late palæolithic man, the brevity of duration is to be attributed to the conditions of primitive life. In both groups, also, the cause of death is clear. It was due to violence—wounds inflicted by club and axe or spear as the case may be—whereas the members of the Pithecanthropus group died by accident as the consequence of a volcanic eruption.

Neither bones nor teeth show evidence of disease, while the repair of fractures and the ready formation of secondary dentine points to greater powers of recuperation than in modern man. Further, the absence of decay in the teeth suggests a resistance to bacterial infection which may account for the absence of disease, with the doubtful exception of an arthritic affection in the vertebræ of the old man of the Upper Cave. In undomesticated animals a natural power of resistance to disease and influences of a detrimental character destroying the efficiency of the organs apparently compensates for the dangers of attack and extermination by their enemies, and the same may hold good of primitive man.

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EIGHTH AMERICAN SCIENTIFIC CONGRESS

THE Eighth American Scientific Congress will be held in Washington, D.C., during May 10–18, 1940, under the auspices of the Government of the United States of America. Invitations on behalf of the President have been extended to the Governments of the American republics members of the Pan American Union to participate in the meeting, and scientific institutions and organizations are being invited to send representatives.

On April 14, 1940, the Pan American Union will celebrate its fiftieth anniversary. Although the Eighth American Scientific Congress will meet a few weeks after the anniversary date, the Congress will be one of the important phases of that celebration. It is hoped that the presence in Washington of many distinguished scientific workers of all of the American republics as participants in this Congress will serve as one of the many tributes to the Pan American Union for its work in the fostering of goodwill and better understanding among the republics of the western hemisphere.

This series of inter-American meetings, serving as a medium for the exchange of scientific information of particular interest and importance to the Governments and peoples of the Americas, dates from the first Latin American Scientific Congress held at Buenos Aires in April 1898 in commemoration of the silver jubilee of the Argentine Scientific Congress. The Second Latin American Scientific Congress was held at Montevideo in 1901 and the Third at Rio de Janeiro in 1905.

In 1908 the Government of Chile, which had offered to act as host to the Fourth Latin American Scientific Congress, enlarged the scope of the meeting and invited the Government of the United States of America to participate. At the same time, the name of the meeting was changed to the First Pan American Scientific Congress.

The Second Pan American Scientific Congress was in session in Washington, D.C., during December 27, 1915–January 8, 1916, and inspired a wide interest on the part of the Governments and scientific workers of the other American republics. A total of 2,566 participated in the sessions, including ninety official delegates of twenty Governments and a hundred and thirty representatives of scientific organizations and institutions in the other American republics.

The Third Pan American Scientific Congress was held at Lima, Peru, in December 1924 and January 1925. The fourth meeting in this second series of scientific congresses was held in Mexico City in September 1935, and in recognition of the continuity of the preceding conferences was designated as the Seventh American Scientific Congress. A resolution adopted at the Seventh Congress reposed in the governing board of the Pan American Union the responsibility for the selection of the date and place of the next meeting. In due course it was decided that the necessary steps would be taken to arrange for the convening of the Eighth Congress in Washington in connexion with the celebration of the fiftieth anniversary of the founding of the Union.

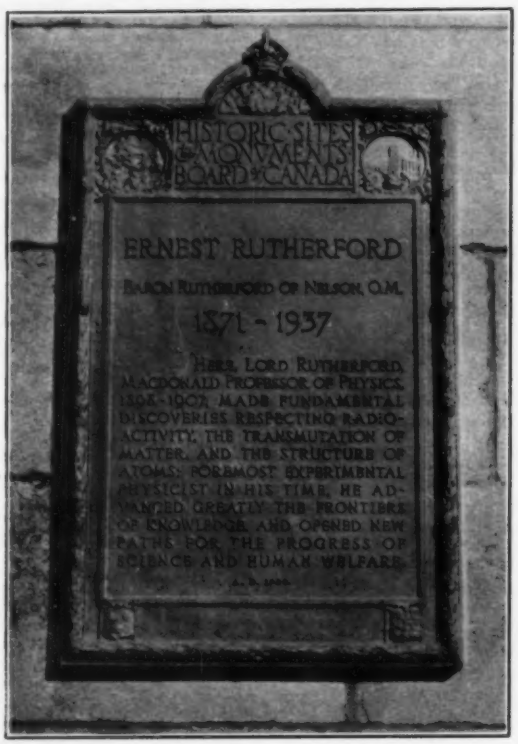
An organizing committee has been set up including the Hon. Sumner Welles, Under Secretary of State (*chairman*), Dr. Warren Kelchner, acting chief, Division of International Conferences, Department of State (*vice-chairman*), and Dr. Alexander Wetmore, assistant secretary of the Smithsonian Institution (*secretary*), to collaborate with the Department of State in formulating definite plans for the Congress. Dr. Wetmore has been appointed also as Secretary General of the Congress.

It has been decided that the Congress will be divided into the following sections, each to be in charge of a chairman, assisted by a vice-chairman, secretary and section committee: I, Anthropological Sciences; II, Biological Sciences; III, Geological Sciences; IV, Agriculture and Conservation; V, Public Health and Medicine; VI, Physical and Chemical Sciences; VII, Statistics; VIII, History and Geography; IX, International Law, Public Law and Jurisprudence; X, Economics and Sociology; XI, Education.

In accordance with established precedent at inter-American conferences, the official languages of the Congress will be English, Spanish, Portuguese and French. Papers may be submitted in any one of the official languages and appropriate arrangements will be made for the presentation of these papers, or résumés thereof, in the other official languages of the Congress.

MEMORIAL TABLET TO LORD RUTHERFORD AT McGILL UNIVERSITY

THE Historic Sites and Monuments Board of Canada recently presented to McGill University a memorial tablet in honour of Lord Rutherford and the work he did while in Montreal. This tablet is now placed on the outside wall of the Macdonald Physics Laboratory, McGill University. As many of the plaques and tablets prepared by the Monuments Board commemorate historic events such as battles, it is gratifying that there should be national recognition of scientific activities which, although they transcend in importance historical incidents of conflict, are so often neglected in the public recognition of important persons and events.


HISTORIC SITES & MONUMENTS BOARD OF CANADA
ERNEST RUTHERFORD
BARON RUTHERFORD OF NELSON, O.M.
1871 - 1937
HERE, LORD RUTHERFORD, MACDONALD PROFESSOR OF PHYSICS, 1898-1907, MADE FUNDAMENTAL DISCOVERIES RESPECTING RADIO-ACTIVITY, THE TRANSMUTATION OF MATTER, AND THE STRUCTURE OF ATOMS; FOREMOST EXPERIMENTAL PHYSICIST IN HIS TIME, HE ADVANCED GREATLY THE FRONTIERS OF KNOWLEDGE, AND OPENED NEW PATHS FOR THE PROGRESS OF SCIENCE AND HUMAN WELFARE.

TABLET IN COMMEMORATION OF LORD RUTHERFORD, RECENTLY PRESENTED TO McGILL UNIVERSITY BY THE HISTORIC SITES AND MONUMENTS BOARD OF CANADA.

A short unveiling ceremony was held in the Physics Laboratory at McGill on October 6, immediately preceding the Autumn Convocation for the granting of degrees. About a hundred persons attended the ceremony, including many old pupils and colleagues of Lord Rutherford. Sir Edward Beatty, chancellor of McGill University, presided, and a number of visitors from other universities and institutions were present. For the unveiling ceremony, the tablet was placed in the large lecture theatre of the laboratory, and surrounded by an exhibition of the apparatus used by Lord Rutherford during his nine years at McGill University, when he elucidated the phenomenon of radioactivity, and laid the foundations of much of his subsequent work. This apparatus has been admirably catalogued and described by Dr. F. R. Terroux (*Transactions of the Royal Society of Canada*, 32, Sec. III 9-16; 1938), who acts as custodian of the collection.

The ceremony was opened by Sir Edward Beatty with a tribute to Lord Rutherford, and a statement about the tablet and its formal acceptance with the gratitude of the University for this recognition. Prof. A. Norman Shaw, director of the Laboratory, referred to "the depth of feeling and the warm affection with which Rutherford is regarded in this Laboratory . . . our scientific ideals, our long and continued output of research, and the irrepressible urge to better our own limited efforts, are derived in large measure—and will continue to be derived—from the undying influence of Rutherford within these walls. It was in this very room he first announced some of the greatest of his discoveries and revealed his uncanny instinct for the next best step. Here are some of his famous pieces of apparatus which reveal the ingenuity and simple directness of much of his early work".

The Honourable Justice E. Fabre Surveyer, who is professor of civil law in McGill University, performed the unveiling ceremony, acting on behalf of the Historic Sites and Monuments Board of Canada. He said: "The Historic Sites and Monuments Board of Canada received with enthusiasm the suggestion made to it by a citizen of Montreal, Mr. Arthur J. Livinson, to commemorate by a tablet the important services rendered to science by the late Lord Rutherford. The members of the Board only divided on two questions: the site of the tablet and the date of its inauguration. Some were of opinion that the most suitable place was the house Lord Rutherford lived in while in Montreal, which, by the way, is for sale, and should, in my opinion, be secured by a friend of the University and turned into rooms for students or bachelor professors. Some also thought it advisable to postpone the inauguration so as not to affect too seriously our budget for 1939–40. Neither of these suggestions appealed to me." Eventually it was decided to place the tablet in the wall of the laboratory where Rutherford worked.

At the conclusion of the ceremony the guests remained for an informal inspection of Rutherford's apparatus, some of the essential features of which were explained by Dr. F. R. Terroux to the audience.

SCIENCE NEWS A CENTURY AGO

Davies Gilbert, F.R.S., 1769-1839

ON December 24, 1839, Davies Gilbert, president of the Royal Society from November 6, 1827 to November 30, 1830, died at Eastbourne at the age of seventy-two. Gilbert was born on March 6, 1769, at Tredrea, in the parish of St. Erth, Cornwall, his father being the Rev. Edward Giddy, curate of that place, who had married an heiress of considerable property. Educated at first by his father, he afterwards attended schools at Penzance and Bristol and in 1785 became a gentleman-commoner of Pembroke College, Oxford. He had already devoted much study to the physical sciences, and he became known as "the Cornish philosopher". In 1791, at the early age of twenty-four, he was elected F.R.S. Being free to follow his own inclinations, he left Oxford in 1793 and returned to Cornwall, acting as sheriff, dividing his time between his magisterial duties and the cultivation of science and literature, and was the friend and correspondent of Beddoes, Davy, Hitchins, Hellins, Trevithick and Hornblower. In 1804, a new sphere of activities opened for him by his election as M.P. for Helston. Two years later he was elected to represent Bodmin and he continued to sit for that borough until December 1832. "He was," says Wild, "emphatically the representative of scientific interests in the House of Commons, and contributed by his exertions to carry many very important objects. Indeed, he was continually called on to serve on committees of inquiry touching scientific and financial questions." In 1808 he married Mary Ann Gilbert, only niece of Charles Gilbert of Eastbourne and then assumed the name and arms of Gilbert.

Gilbert had a wide range of interests. He contributed papers to the *Philosophical Transactions*, and the *Quarterly Journal of Science and Arts*, was a collector of traditions, songs and carols of Cornwall, and in 1838 published "The Parochial History of Cornwall". From 1814 until his death he was president of the Royal Geological Society of Cornwall. He calculated for Telford the lengths of the chains for the Menai Straits Suspension Bridge, selected Brunel's design for the Clifton Suspension Bridge, suggested the founding of an observatory at the Cape of Good Hope, was chairman of the committee for rebuilding London Bridge, and was an advocate for the construction of Plymouth Breakwater.

J. D. Forbes, Baden Powell and Melloni

WRITING from Edinburgh on December 27, 1839, to Prof. Baden Powell, J. D. Forbes said: "I own that I should be very glad to see a good synopsis of what has been done during the last eight years, well aware that, so far as my own contributions are concerned, they were published in a form repulsive to the generality of readers, and even to many men of science who would willingly glean from your critical pages how much has been established, and on what kind of evidence, without troubling themselves about details. . . .

"I hope that you will not treat Melloni's papers so slightly as you propose. His earlier ones are full of interesting and original experiments. So far as I am concerned, I have nothing to wish but that everything Melloni has done should be fully and accurately known, for by a rare good fortune there is not a single debate in point of priority between us, and every experiment we have in common, with a single exception—the variable polarizability—confirms each other's results. It is for you as a critic to judge how far, if in any case my right conclusions were founded on false grounds, for this is the sum of Melloni's captious criticisms."

APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates mentioned:

ASSISTANT LECTURERS IN AGRICULTURE at the Essex Institute of Agriculture, Writtle—The Clerk to the Essex County Council, County Hall, Chelmsford (December 30).

HEADMASTERSHIP OF THE HEREFORD CATHEDRAL GRAMMAR SCHOOL—The Clerks to the Governors, A. D. Steel and Son, 30 Castle Street, Hereford (January 13).

LECTURER IN ENGINEERING—The Principal, Dudley and Staffordshire Technical College, The Broadway, Dudley.

SECTION ENGINEER for the Nigerian Government Railway—The Crown Agents for the Colonies, 4 Millbank, S.W.1 (quoting M/9071).

ASSISTANT ENGINEER in the Chief Engineer's Department of the River Great Ouse Catchment Board—The Chief Engineer, River Great Ouse Catchment Board, Brooksland Avenue, Cambridge.

REPORTS AND OTHER PUBLICATIONS

(not included in the monthly Books Supplement)

Great Britain and Ireland

National Physical Laboratory. Abstracts of Papers published in the Year 1938. Pp. iii+63. (London: H.M. Stationery Office.) 1s. net. [2911

Other Countries

Memoirs of the India Meteorological Department. Vol. 26, Part 10: The General Circulation of the Atmosphere over India and its Neighbourhood. By K. R. Ramanathan and K. P. Ramakrishnan. Pp. ii+189-246+74 plates. (Delhi: Manager of Publications.) 10.8 rupees; 16s. 6d. [2211

Malnutrition in South Africa. By Dr. Ellen M. Radloff and Dr. T. W. B. Osborn. Pp. ii+34. (Johannesburg: Witwatersrand University Press.) 2s. [2311

Report of the Administration of the British East African Meteorological Service for the Year 1938. Pp. 52. (Nairobi: British East African Meteorological Service.) [2411

Cornell University: Agricultural Experiment Station. Bulletin 716: Relation of Market Quality to the Price Received for Long Island Cauliflower. By John D. Hartman. Pp. 36. Bulletin 717: Apple Orchards; Cost of Developing, Values and Financial Returns. By G. P. Scoville. Pp. 44. Bulletin 718: Downy Mildew of Spinach and its Control. By Mathias C. Richards. Pp. 30. Bulletin 719: Relation of Size of Cow to Production and Cost of Production of Milk on 94 Grade A Farms in the Tully-Homer Area. By E. G. Misner. Pp. 26. Bulletin 720: An Economic Study of Land Utilization in Chautauqua County, New York. By Alexander Joss. Pp. 52. Bulletin 721: An Economic Study of Fruit and Vegetable Wholesaling and Jobbing Firms in New York City. By T. N. Gearreald. Pp. 68. Bulletin 722: Soybeans as a Source of Fat in the Dairy Ration. By L. A. Maynard, Karl E. Gardner and Adrian Hodson. Pp. 30. Memoir 225: The Culinary Quality of Apples as determined by the use of New York State Varieties. By Marion C. Pfund. Pp. 74. Memoir 226: Some Comparisons between Analyses of Narrative and Film Records of Behavior and Guidance of Children. By Ethel B. Waring, Frances Markey Dwyer and Elsie Junkin. Pp. 50. (Ithaca, N.Y.: Cornell University.) [2711

The Grasslands of the Falkland Islands. By William Davies. Pp. x+86+18 plates. (Stanley: Government Printer; London: Crown Agents for the Colonies.) 5s. [2711

Mitteilungen der Sternwarte Budapest-Svábhegy. Nr. 8: Untersuchungen über die Perioden- und Lichtkurvenänderungen von Kurzperiodischen δ Cephei Sternen, 2, Ar Herculis. Von Julia Balázs und L. Detre. Pp. 49. (Budapest: Sternwarte Budapest-Svábhegy.) [2711

Memoirs of the Geological Survey of India. Palæontologia Sinica, New Series, Vol. 26, Memoir No. 1: The Fossil Bovidæ of India. By Dr. Guy E. Pilgrim. Pp. viii+356+8 plates. 15.4 rupees; 23s. 6d. Palæontologia Sinica, New Series, Vol. 28, Memoir No. 1: Fossil Fauna from the Tertiary of Garo Hills, Assam. By P. N. Mukerjee. Pp. viii+104+3 plates. 4.14 rupees; 7s. 9d. (Calcutta: Geological Survey of India.) [2911

Catalogues, etc.

Phytoferol: a Standardised Solution of Vitamin E. Pp. 14. (London: The British Drug Houses, Ltd.)

The Wild-Barfield Heat-Treatment Journal. Vol. 3, No. 22, September 1939. Pp. 65-78+iv. (London: Wild-Barfield Electric Furnaces, Ltd.)

Old Science and Medicine. (Catalogue 53.) Pp. 48. (London: E. P. Goldschmidt and Co., Ltd.)

Calendar for 1940. (London: Evershed and Vignoles, Ltd.)

Calendar for 1940. (Newcastle-on-Tyne: C. A. Parsons and Co., Ltd.)